

economic benefit of acupuncturists.

This suit challenges the Board's rules related to acupuncture. In each case, the Acupuncturist Association contends the Board exceeded its authority under the Texas Chiropractic Act. The language of the Act limits chiropractors to "nonincisive" procedures. The Acupuncturist Association contends that needles are inherently "incisive" and thus beyond the pale for chiropractors—even though their own statute, the Acupuncture Act, defines "acupuncture" as the "*nonincisive* insertion of an acupuncture needle." Tex. Occ. Code § 205.001(2) (emphasis added).

Fortunately, in the many years this case has been pending, prior rulings have narrowed the issues. The Acupuncturist Association originally challenged four of the Board's rules. In 2015, this Court granted summary judgment for the Board on all four rules. In 2017, the Third Court of Appeals affirmed summary judgment in the Board's favor on two of the four rules at issue. Critically, the court upheld the Board's rule defining "incisive" to mean making a "*cut*." The court reversed on the other two rules on the ground that neither party made an adequate summary-judgment record. The court noted, however, that the Board could prevail if it showed that acupuncture needles *do not cut*.

With the issues so narrowed, the Court should grant this motion for two reasons.

First, the Board is attaching conclusive evidence that acupuncture needles are *pointed* and thus do not cut. Dictionaries draw a distinction between "cutting," which is done by an edged instrument, and "piercing," which is done by a pointed instrument. Thus, by virtue of their shape alone, acupuncture needles do not "cut" and are "nonincisive" as a matter of law.

Second, the Board's rules are not overbroad. They do not exceed the Chiropractic Act by letting chiropractors utilize the entire field of acupuncture. Reading the Board's rules as an indivisible whole, their limits are clear: chiropractors can only use acupuncture for musculoskeletal

purposes. This faithfully tracks the statutory scope of practice and is not overbroad.

To distract from these legal arguments, the Acupuncturist Association will undoubtedly want to issue ominous warnings. They will try to tell the Court that acupuncturists have more training than chiropractors. They will warn that needles in the hands of chiropractors are a threat to public safety. Aside from being untrue,¹ none of this is legally relevant. In two recent decisions, the Supreme Court gave trial courts a roadmap for deciding this kind of rule challenge. That roadmap requires courts to stick to textual analysis and not veer into policy debates such as the relative qualifications of different healthcare providers. And whenever reasonable minds can differ, the Supreme Court requires deference to the Board’s determinations.

All roads lead to one conclusion: as a matter of law, the Board’s rules regarding acupuncture are consistent with the Chiropractic Act and must be upheld as valid. Summary judgment should be granted in the Board’s favor.

PROCEDURAL HISTORY

The ultimate authority in this case is the Texas Chiropractic Act, which defines the scope of practice for chiropractors.

Table 1. Relevant text of the Chiropractic Act.

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| “A person practices chiropractic under this chapter if the person . . . performs nonsurgical, <i>nonincisive procedures</i> , including adjustment and manipulation, to improve the subluxation complex or the biomechanics of the musculoskeletal system;” | Tex. Occ. Code § 201.002(b) |
| “‘Incisive or surgical procedure’ includes <i>making an incision</i> into any tissue, cavity, or organ by any person or implement. The term does not include the use of a needle for the purpose of drawing blood for diagnostic testing.” | Tex. Occ. Code § 201.002(a)(3) |

¹ Chiropractors have much more training in physiology and anatomy than acupuncturists, and are already trained in the use of needles because they are authorized by statute to draw blood.

The Board first adopted a rule recognizing chiropractors' right to use acupuncture in 2006. *See* 31 Tex. Reg. 4624 (2006) (former Rule 78.13).² In 2009, the Board added two requirements for chiropractors to perform acupuncture: 100 hours of acupuncture training, and passing a national acupuncture examination. 34 Tex. Reg. 4333 (2009) (former Rule 75.21).

The Acupuncturist Association did not file this lawsuit until 2014, almost *eight years* after the Board adopted its first acupuncture rule. The Association challenged four of the Board's rules. The rules were renumbered mid-litigation, so the following table shows both numbers.

Table 2. Rules at issue.

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| "Incision -- A cut or a surgical wound; also, a division of the soft parts made with a knife or hot laser." | Former Rule 78.13(a)(4) |
| | Current Rule 78.1(a)(4) |
| "Needles may be used in the practice of chiropractic under standards set forth by the Board but may not be used for procedures that are incisive or surgical." | Former Rule 78.13(b)(2) |
| | Current Rule 78.1(b)(2) |
| "In order to provide therapeutic care for a patient or patient population, licensees are authorized to use: . . . acupuncture and other reflex techniques;" | Former Rule 78.13(e)(2)(C) |
| | Current Rule 78.1(e)(2)(C) |
| Defining "acupuncture" and requiring 100 hours of acupuncture education and a passing score on a national acupuncture examination. | Former Rule 75.21 |
| | Current Rule 78.14 |

In 2014, the parties filed cross-motions for summary judgment. The court denied the

² In its order adopting the rule, the Board noted that:

Chiropractors in Texas have included acupuncture as part of their practice for decades without complaint. Acupuncture is part of the curriculum at the chiropractic colleges. In addition, the National Board of Chiropractic Examiners offers a national, standardized certification examination in acupuncture and Texas Chiropractic College offers a post-graduate 300-hour diplomate approved course in acupuncture, in addition to the 4,500 didactic and clinical hours required for licensure. The Board has not received complaints regarding the practice of acupuncture by a chiropractor, and at the February 1, 2006 [public hearing], the Board heard testimony that no malpractice claims had been made relating to the practice of acupuncture by a chiropractor in Texas.

31 Tex. Reg. 4621.

Acupuncturist Association’s motion, granted the Board’s motion, and signed a final judgment upholding the Board’s rules.

On appeal, the Third Court of Appeals affirmed in part and reversed in part. *See Tex. Ass’n of Acupuncture & Oriental Med. v. Tex. Bd. of Chiropractic Exam’rs*, 524 S.W.3d 734 (Tex. App—Austin 2017, no pet.) (hereafter “*TAAOM I*”). Critically, the court ***affirmed*** judgment in the Board’s favor on the first two provisions in Table 2 above. The court held that the Board’s definition of “incision” as a “cut” or “surgical wound” was a reasonable construction of the Chiropractic Act and consistent with the statutory text. *Id.* at 742. The court noted that “the Chiropractic Board’s definition of ‘incision,’ which recognizes that some needles may be considered ‘incisive,’ while other needles may not, is reasonable and consistent with the technical meaning of the term ‘incisive’ and also with the Legislature’s view [in the Acupuncture Act] that acupuncture needles are at least capable of being inserted into the body in a ‘nonincisive’ and ‘nonsurgical’ manner.” *Id.*

Nonetheless, the court also held that summary judgment was premature for either party on the remaining question: whether acupuncture needles “cut” and are therefore “incisive” under the Board’s definition. *Id.* at 743-44. The reason was that neither party had presented summary judgment evidence about ***the shape of acupuncture needles***:

- “The Acupuncture Association does not contend, nor is there any evidence in the summary-judgment record suggesting, that acupuncture needles ***always*** have a beveled edge or that the needles are otherwise capable of cutting.” *Id.* at 743 (emphasis added).
- “The Chiropractic Board, however, does not contend that it presented summary-judgment evidence conclusively establishing that acupuncture needles are not capable of ‘cutting’ and thus are ‘nonincisive.’” *Id.* Instead, the Board relied on the legal argument (rejected by the court) that the Chiropractic Act necessarily incorporates the same definition of “nonincisive” as the Acupuncture Act. *Id.* at 743-45.

The court remanded for additional proceedings “on this issue.” *Id.* at 746.

On remand, the parties agreed to abate the case to engage in negotiated rulemaking, although the Board later opted to engage in several stakeholder meetings concerning revisions to the rules. During that process, the Board reorganized some of its rules, 43 Tex. Reg. 6963 (2018), and ultimately made only minor changes to Rule 78.14. *See* 43 Tex. Reg. 7763 (2018).³

Thus, this case is at essentially the same place it was after the court of appeals' decision in 2017. The issues have been narrowed to one main question: whether acupuncture needles "cut" and are thus "incisive" under the Board's definition.

LEGAL STANDARD

The Acupuncturist Association filed this case under Texas Government Code Section 2001.038. The applicable legal standard can be found in two Texas Supreme Court decisions addressing challenges to similar scope-of-practice rules: one involving chiropractors, *Tex. Bd. of Chiropractic Exam'rs v. Tex. Med. Ass'n*, 616 S.W.3d 558 (Tex. 2021) (hereafter "*TBCE*"); and the other involving marriage and family therapists, *Tex. State Bd. of Exam'rs of Marriage & Family Therapists v. Tex. Med. Ass'n*, 511 S.W.3d 28 (Tex. 2017) (hereafter "*MFT*").

The Acupuncturist Association is challenging the facial validity of the Board's rules. *See TBCE*, 616 S.W.3d at 575. The rules are presumed valid. *Id.* at 568. The Acupuncturist Association bears the burden of proving invalidity by showing that the rules: (1) contravene specific statutory language; (2) run counter to the general objectives of the statute; or (3) impose additional restrictions inconsistent with statutory provisions. *MFT*, 511 S.W.3d at 33-34. For the second prong, courts must "discern those 'general objectives' from the plain text of the statutes

³ In its order adopting these amendments, the Board "again note[d] that there is no empirical evidence that any person in Texas has been harmed by a chiropractor practicing acupuncture under either the Board's current rule, which requires 100 hours of training in acupuncture beyond the extensive training in physiology and anatomy all chiropractors receive in their four-year chiropractic college degree programs, or in the several decades before the rule's adoption. ... Doctors of chiropractic on average receive over 4200 hours of doctoral-level training that focuses on anatomy and physiology, which far exceeds the training an undergraduate-level acupuncturist receives." 43 Tex. Reg. 7765.

that grant or limit the agency's authority." *Id.* at 33. Because "[j]udges are experts in statutory analysis, not in healthcare," engaging only in "textual analysis" ensures that they "will stay in their lane." *TBCE*, 616 S.W.3d at 571. Thus, in scope-of-practice disputes, courts are forbidden from considering policy questions, such as whether practitioners are qualified to use a certain procedure. *Id.* at 569, 575. A facial challenge "involves only questions of law." *Id.* at 568.

The Court's review of Board rules must be deferential. A rule will be upheld if it reflects a reasonable interpretation of the Act and is not inconsistent with the statutory text. *See TAAOM I*, 524 S.W.3d at 742-43 (quoting *TGS-NOPEC Geophysical Co. v. Combs*, 340 S.W.3d 432, 438 (Tex. 2011) ("If there is vagueness, ambiguity, or room for policy determinations in a statute or regulation, ... we normally defer to the agency's interpretation unless it is plainly erroneous or inconsistent with the language of the statute, regulation, or rule.")). With regard to the Board in particular, the Supreme Court has emphasized that "the Legislature has delegated to a regulated group of practitioners and public members the responsibility for 'clarifying what activities are included within the scope of practice of chiropractic and what activities are outside that scope.'" *TBCE*, 616 S.W.3d at 571 (quoting Tex. Occ. Code § 201.1525). As a result, when a rule-challenger and the Board present reasonable alternatives, "it is not for the judiciary to decide between these competing views" because "[t]hat decision was the Board's." *Id.* at 573.

Summary judgment should be granted if the only material facts are established by conclusive evidence, *TAAOM I*, 524 S.W.3d at 743, or if the claims present only questions of law for the Court. *MFT*, 511 S.W.3d at 32, 42; *TAAOM I*, 524 S.W.3d at 742-43.

ARGUMENT

I. The court of appeals has narrowed the issues in this case.

As explained above, two of the four rules are no longer at issue. The court of appeals affirmed the validity of the Board rule defining “incisive” to mean making a “cut” or “surgical wound.” *TAAOM I*, 524 S.W.3d at 742 (former Rule 78.13(a)(4), now Rule 78.1(a)(4)). The court also affirmed the validity of the Board’s determination that some needles are “incisive” while others are not. *Id.* at 742-43 (former Rule 78.13(b)(2), now Rule 78.1(b)(2)). These holdings are the law of the case and binding on this Court. *See Paradigm Oil, Inc. v. Retamco Operating, Inc.*, 372 S.W.3d 177, 182 (Tex. 2012).

Thus, only the final two rules in Table 2 are still at issue. The court of appeals indicated that the Board could obtain summary judgment on those rules by “conclusively establishing that acupuncture needles do not ‘cut’ and thus are ‘nonincisive.’” *TAAOM I*, 524 S.W.3d at 743. This motion makes that showing in the next section.

II. Acupuncture needles have a pointed tip and therefore do not cut.

The word “cut” is not expressly defined in the statute or rules. When interpreting a rule, courts apply the common, ordinary meaning unless a different meaning is apparent from the context. *MFT*, 511 S.W.3d at 34. Meaning should be found in dictionaries. *Id.* at 35.

Here, dictionaries commonly draw a distinction between **cutting**, which is done by an **edged** instrument, and **piercing**, which is done by a **pointed** instrument. Consider the following definitions (copies attached as Exhibit A):

Table 3. Dictionary definitions.

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| Webster's Third New International Dictionary (2002) <ul style="list-style-type: none">- "Cut" means "to penetrate with or as if with an <i>edged</i> instrument." (560)- "Pierce" means "to run into or through as a <i>pointed</i> instrument or weapon does." (1712)- "Sharp" means "adapted to <i>cutting or piercing</i>." (2088) ⁴ |
| Oxford Dictionary of English (3rd ed. 2010) <ul style="list-style-type: none">- "Cut" means "make an opening, incision, or wound in (something) with a <i>sharp-edged</i> tool or object." (431)- "Pierce" means "(of a sharp <i>pointed</i> object) go into or through (something)." (1344)- "Sharp" means "having an edge or point that is able to <i>cut or pierce</i> something." (1637) |
| Merriam Webster's Collegiate Dictionary (10th ed. 1996) <ul style="list-style-type: none">- "Cut" means "to penetrate with or as if with an <i>edged</i> instrument." (286)- "Pierce" means "to run into or through as a <i>pointed</i> weapon does." (878)- "Sharp" means "adapted to <i>cutting or piercing</i>: as ... having a thin keen edge or fine point." (1077)- "Puncture" means "to pierce with or as if with a pointed instrument or object." (945)- "Acupuncture" means "an orig. Chinese practice of puncturing the body (as with needles) as specific points to cure disease or relieve pain (as in surgery)." (12) |
| Longman's Dictionary of the English Language (2nd ed. 1991) <ul style="list-style-type: none">- "Cut" means "to penetrate (as if) with an <i>edged</i> instrument; make an incision into." (391)- "Pierce" means "to run into or through as a <i>pointed</i> weapon does; stab." (1212)- "Sharp" means "adapted to <i>cutting or piercing</i>." (1483)- "Puncture" means "to pierce with a pointed instrument or object." (1300) |

⁴ Obviously, the definition of "sharp" would not need to mention both "cutting" and "piercing" if cutting already included piercing.

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| <ul style="list-style-type: none"> - “Acupuncture” means “an originally Chinese practice of puncturing the body at particular points with needles, esp to cure disease, relieve pain, or produce anesthesia.” (17) |
| <p>The American Heritage Stedman’s Medical Dictionary (2nd ed. 2004)</p> <ul style="list-style-type: none"> - “Cut” means “1. To penetrate with a sharp <i>edge</i>; strike a narrow opening in; 2. To separate into parts with or as if with a <i>sharp-edged</i> instrument; sever.” (199) - “Puncture” means “To pierce with a <i>pointed</i> object, as with a needle.” (684) - “Acupuncture” means “A procedure used in or adapted from Chinese medical practice in which specific body areas are pierced with fine needles for therapeutic purposes or to relieve pain or produce regional anesthesia.” (14) |
| <p>Dorland’s Illustrated Medical Dictionary (31st ed. 2007)</p> <ul style="list-style-type: none"> - “Cut” means “a narrow cleft or wound made by a sharp <i>edge</i>.” (458) - “Puncture” means “the act of piercing or penetrating with a <i>pointed</i> object or instrument.” (1578) |

Here, the evidence conclusively shows that acupuncture needles, which are often barely larger than a human hair, have a *pointed tip*. They do not have a beveled or other cutting edge. Attached as Exhibit B-1 are images of several common acupuncture needles. As the images show, the needles are pointed and do not have a beveled or other cutting edge. Their pointed tips are also confirmed by a longtime practitioner of acupuncture in Texas. Ex. C. These needles are used by both chiropractors and acupuncturists in Texas. *Id.* As a result, the Court now has conclusive evidence that at least some acupuncture needles do not “cut” and thus are not “incisive.”

The Acupuncturist Association may try to dig up other acupuncture needles that do have a beveled or cutting edge. But it would make no difference. The Board’s rules, far from authorizing the use of such needles, would expressly forbid it. *See* 22 Tex. Admin. Code § 78.2(a)(5) (“A licensee may not . . . use a needle for procedures that make an incision other than for drawing blood for diagnostic purposes.”); *id.* § 78.1(b)(2) (“Needles may be used in the practice of

chiropractic under standards set forth by the Board but may not be used for procedures that are incisive or surgical.”).

The Acupuncturist Association may also respond by citing dictionaries with different definitions of “cut” and “pierce.” Given the countless dictionaries on the market, discrepancies would not be surprising. But as already noted, the Court must defer to the Board’s reasonable interpretations. That is exactly what the Third Court of Appeals previously did in this case when it upheld the Board’s rule defining “incisive.” *See TAAOM I*, 524 S.W.3d at 742. And that is exactly what the Texas Supreme Court did in 2021 when it upheld the Board’s rules defining “musculoskeletal system” and “subluxation complex.” *See TBCE*, 616 S.W.3d at 572-73. As the dictionaries cited above demonstrate, the Board’s interpretation is manifestly reasonable and entitled to deference, regardless of what other dictionaries might say. Indeed, there must be some reasonable definition that makes acupuncture needles nonincisive or else the Acupuncture Act itself—which defines “acupuncture” as the “**nonincisive** insertion of an acupuncture needle”—would be nonsensical. Tex. Occ. Code § 205.001(2) (emphasis added).

In any event, the Third Court of Appeals has already blessed the distinction between “cutting” and “piercing” as reasonable. In 2012, the court struck down a Board rule authorizing chiropractors to use a procedure called “needle EMG” because its needles had a cutting edge. *See Tex. Bd. of Chiropractic Exam’rs v. Tex. Med. Ass’n*, 375 S.W.3d 464, 478-482 (Tex. App—Austin 2012, pet. denied). The court noted that “in the context of health care, ‘incisive’ is used to refer to the act of cutting,” whereas the “ordinary meaning of ‘incisive’ embraces **not only cutting but also ‘piercing’ . . . and ‘penetrating.’**” *Id.* at 479-80 (citing various dictionary definitions; emphasis added). The court acknowledged that the Board adopted the former definition of “incisive.” *Id.* at 480. The court defined “cut” as “penetrate with or as if **with an edged**

instrument”—the same definition advanced by the Board in this motion. *Id.* at 480-81 (emphasis added). The court noted that “in the context of health care, needles with beveled edges are said to ‘cut’ or have a ‘cutting edge,’ as contrasted with differently edged needles that do not”—and “this distinction between beveled, ‘cutting’ needles and other kinds that do not ‘cut’ would perhaps explain how, in the Legislature’s view [as reflected in the Acupuncture Act], acupuncture needles would be capable of being inserted into the body in a ‘nonincisive’ and ‘nonsurgical’ manner.” *Id.* at 481. Because needles used in needle EMG had a beveled edge and thus “cut,” they were “incisive” under any definition, and the procedure was outside the scope of practice for chiropractors. *Id.* By the same logic, of course, pointed acupuncture needles do **not** “cut” and so are **not** “incisive.”⁵

In short, acupuncture needles that are pointed do not cut. As a matter of law, this makes them “nonincisive” under the Chiropractic Act as reasonably construed by the Board. Accordingly, the Board’s rules, which only authorize the use of pointed acupuncture needles, are reasonable, consistent with the Act, and must be upheld as valid.

III. The Board’s acupuncture rules are not overbroad.

In its petition, the Acupuncturist Association argues that the Board’s rules unlawfully authorize chiropractors to perform the full scope of acupuncture, regardless of whether a patient’s condition is musculoskeletal or otherwise within the scope of practice. *See* TAAOM’s 4th Am. Pet. ¶ 38. Nothing could be further from the truth. The Board’s acupuncture rules—read as a whole and in conjunction with the Board’s other rules—do **not** authorize chiropractors to perform

⁵ Incidentally, the distinction between beveled and pointed needles explains why the Chiropractic Act expressly excludes drawing blood from the general prohibition on “incisive procedures.” Tex. Occ. Code § 201.002(a)(3). The needles used for drawing blood have a beveled edge. *See* Lynn B. Hoeltke, *Phlebotomy Procedures and Practices* 30 (2nd ed. 2013) (“All needles for venipuncture are manufactured with an angled bevel on the tip of the needle.”). Thus, blood-drawing needles “cut” and would be banned “incisive procedures” without an exception—unlike pointed acupuncture needles, which never fall under the general prohibition in the first place.

acupuncture for all purposes, and instead authorize only a limited use of acupuncture consistent with the Chiropractic Act.

A. Rule 78.1 authorizes acupuncture only for lawful purposes.

To see the limits of Rule 78.1, the rule must be viewed in its entirety. It references acupuncture in part (e), which has two subparts. Subpart (1) describes the authorized *purposes* of treatment. Subpart (2) lists permissible *means* of achieving those purposes—including, among other things, acupuncture. In other words, subpart (1) limits subpart (2). The subparts cannot be read in isolation. This connection is obvious when part (e) is read as a whole:

Table 4. Treatment rule – Rule 78.1(e).

(e) Treatment Procedures and Services.

(1) In the practice of chiropractic, licensees recommend, perform, or oversee the performance of the treatment procedures that are indicated in the therapeutic care of a patient or patient population in order to:

- (A) Improve, correct, or optimize the biomechanical condition of the spine or musculoskeletal system of the human body ... ;
- (B) Promote the healing, recovery from, or prevent the development or deterioration of abnormalities of the biomechanical condition of the spine or musculoskeletal system of the human body ... ;
- (C) Promote the healing of, recovery from, or prevent the development or deterioration of a subluxation complex of the spine or musculoskeletal system

(2) In order to provide therapeutic care for a patient or patient population, licensees are authorized to use:

- (A) osseous and soft tissue adjustment and manipulative techniques;
- (B) physical and rehabilitative procedures and modalities;
- (C) ***acupuncture*** and other reflex techniques;
- ...
- (P) other treatment procedures and services consistent with the practice of chiropractic.

22 Tex. Admin. Code § 78.1 (emphasis added)

As a whole, the rule meshes perfectly with the statutory text. Subpart (1) lists purposes that all fit comfortably within the language of the Chiropractic Act, which authorizes chiropractors

to treat patients by “perform[ing] nonsurgical, nonincisive procedures ... *to improve the subluxation complex or the biomechanics of the musculoskeletal system.*” Tex. Occ. Code § 201.002(b) (emphasis added). And because the means listed in subpart (2) can only be used for those authorized purposes, the rule as a whole is consistent with the statute.

In the *TBCE* case, the Texas Supreme Court used this same line of reasoning to uphold a Board rule authorizing a procedure called “VONT.” 616 S.W.3d at 563-65. In that case, the Texas Medical Association challenged a different portion of Rule 78.1 authorizing chiropractors to use VONT. *Id.* at 574. The VONT portion of the rule, in isolation, does not place any limits on the use of VONT. *See* 22 Tex. Admin. Code § 78.1(c)(3)(B). As a result, the Medical Association argued that the Board was authorizing chiropractors to use VONT for any purpose, including out-of-scope neurological testing. 616 S.W.3d at 573. But the VONT language was located in part (c) of Rule 78.1, which—just like part (e) here—has separate subparts for *purposes* and *means*. *Id.* § 78.1(c). The Texas Supreme Court recognized that these parts function together as an indivisible whole, and “*a reading of all the Board’s rules together* makes it clear that a chiropractor’s proper use of VONT is not for treating a neurological condition ... but rather for the limited purpose of determining whether and how to treat a patient’s musculoskeletal system.” 616 S.W.3d at 574 (emphasis added). The court upheld the rule as valid. *Id.* at 574-75. The exact same result, for the exact same reasons, is required here.⁶

The Acupuncturist Association may argue that some chiropractors do not abide by these

⁶ Other Board rules reinforce the limited scope of Rule 78.1(e). *See, e.g.*, 22 Tex. Admin. Code § 78.1(a)(7) (defining “practice of chiropractic” to mean “[t]he description and terms set forth under Texas Occupations Code § 201.002”); *id.* § 78.6(a) (requiring referral to another provider “for a condition outside the scope of practice”); *id.* § 79.2(a)(1) (“A licensee may not ... perform or attempt to perform procedures for which the licensee is untrained.”); *id.* § 80.3 (authorizing disciplinary action by the Board for violations of the Chiropractic Act or any Board rule, including revocation of licensure). The Supreme Court has cited these and similar rules to dispel any lingering doubts about the overbreadth of a scope-of-practice rule. *See TBCE*, 616 S.W.3d at 572 (“The limited nature of Rule 78.1(a)’s definitions is clear when they are considered alongside other Board rules”—including the referral, training, and disciplinary rules cited above); *MFT*, 511 S.W.3d at 39.

limits. Even if true, it would have no bearing on the narrow issues before the Court. As the Supreme Court said in the *TBCE* case, “the answer to [this] concern is in Rule 79, which provides for professional discipline if that were to occur.” 616 S.W.3d at 573.

B. Rule 78.14 merely restricts the use of acupuncture even further.

The other rule at issue does not, on its face, create any additional authority for chiropractors to use acupuncture. Instead, it just adds *restrictions*. For instance, the rule clarifies what services are considered “acupuncture.” 22 Tex. Admin. Code § 78.14(a). It requires a permit before a chiropractor can use acupuncture. *Id.* § 78.14(b) (“A licensee shall practice acupuncture *only after* obtaining a permit from the Texas Board of Chiropractic Examiners (Board).”) (emphasis added). The rule also sets the conditions for obtaining a permit—i.e., taking 100 hours of acupuncture training and passing a national acupuncture examination (subject to certain grandfathering rules). *Id.* § 78.14(e). It limits how chiropractors can advertise their acupuncture services. *Id.* § 78.14(h)-(i). It prohibits a chiropractor from delegating acupuncture. *Id.* § 78.14(d). And it subjects a chiropractor who violates the rule to disciplinary action. *Id.* § 78.14(k). Again, the rule does not expand the scope of practice; it only reinforces limitations on that scope.

The Acupuncturist Association may quibble with these interpretations. Such arguments should be rejected outright for the reasons stated. But even if doubts could be raised, the fact remains that the Board interprets its rules this way, and those interpretations are at the very least reasonable and consistent with the text of the rules and statute. Where there is room for reasonable disagreement, the Court should defer to the Board’s interpretation of its own rules and uphold them. *See Vista Healthcare, Inc. v. Tex. Mut. Ins. Co.*, 324 S.W.3d 264, 272 (Tex. App.—Austin 2010, pet. denied) (“We defer to an agency’s interpretation of its own rules unless that interpretation is plainly erroneous or inconsistent with the text of the rule or underlying statute.”).

PRAYER

Summary judgment should be granted because no genuine issue of material fact remains. This motion has conclusively shown that there are acupuncture needles that are pointed and thus do not “cut.” All the Board’s other determinations are either legally correct or reasonable and entitled to deference. In either case, they do not present questions of fact. The Acupuncturist Association can give the Court no valid reason to overturn decades of limited acupuncture use by Texas chiropractors. For all these reasons, the Board and Intervenor respectfully ask the Court to (1) grant summary judgment affirming the validity of Rules 78.1 and 78.14; (2) render final judgment that the Acupuncturist Association take nothing on its claims against the Board; and (3) grant the Board and Intervenor such other and further relief to which they have shown themselves entitled, either at law or in equity.

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CERTIFICATE OF SERVICE

I hereby certify that a true and correct copy of the foregoing document has been forwarded to all counsel of record herein by way of:

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Matt C. Wood

EXHIBIT A



Webster's
Third New
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Dictionary

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sharp·er \ 'shärpər, 'shäpə(r) \ *n.* a sharp
unduly sharp or excessive

[illegible][illegible]

Oxford Dictionary of English

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Edited by
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First edition edited by
Judy Pearsall
Patrick Hanks

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– ORIGIN late 16th cent.: from medieval Latin *custumale* 'customs book', neuter of *custumalis*, from *custuma* 'custom'.

cut ▶ verb (cutting; past and past participle **cut**) [with obj.]

1 make an opening, incision, or wound in (something) with a sharp-edged tool or object: *he cut his big toe on a sharp stone* | *when fruit is cut open, it goes brown*.

2 remove (something) from something larger by using a sharp implement: *I cut his photograph out of the paper* | *some prisoners had their right hands cut off*. ■ castrate (an animal, especially a horse). ■ (cut something out) make something by cutting: *I cut out some squares of paper*. ■ (cut something out) remove, exclude, or stop eating or doing something undesirable: *start today by cutting out fatty foods*.

■ (cut something out) N. Amer. Separate an animal from the main herd.

3 divide into pieces with a knife or other sharp implement: *cut the beef into thin slices* | *he cut his food up into teeny pieces*. ■ make divisions in (something): *land that has been cut up by streams into forested areas*. ■ separate (something) into two; sever: *they cut the rope before he choked*. ■ (cut something down) cause something to fall by cutting it through at the base. ■ (cut someone down) (of a weapon, bullet, or disease) kill or injure someone: *Barker had been cut down by a sniper's bullet*.

4 make or form (something) by using a sharp tool to remove material: *workmen cut a hole in the pipe*. ■ make or design (a garment) in a particular way: (as adj., with submodifier **cut**) *an impeccably cut suit*.

■ make (a path, tunnel, or other route) by excavation, digging, or chopping: *plans to cut a road through a rainforest* [no obj.] | *investigators called for a machete to cut through the bush*. ■ make (a sound recording).

5 trim or reduce the length of (grass, hair, etc.) by using a sharp implement: *Ted was cutting the lawn* | *cut back all the year's growth to about four leaves*.

6 reduce the amount or quantity of: *buyers will bargain hard to cut the cost of the house they want* | *I should cut down my sugar intake* [no obj.] | *they've cut back on costs*. ■ abridge (a text, film, or performance) by removing material: *he had to cut unnecessary additions made to the opening scene*. ■ Computing delete (part of a text or other display) so as to insert a copy of it elsewhere. See also **CUT AND PASTE** below. ■ end or interrupt the provision of (a supply): *we resolved to cut oil supplies to territories controlled by the rebels* | *if the pump develops a fault, the electrical supply is immediately cut off*. ■ switch off (an engine or a light). ■ N. Amer. absent oneself from (something one should normally attend, especially school): *Rodney was cutting class*.

7 (cut something off) block the usual means of access to a place: *the caves were cut off from the outside world by a landslide*.

8 informal ignore or refuse to recognize (someone): *they cut her in public*.

9 (of a line) cross or intersect (another line). ■ [no obj.] (cut across) pass or traverse, especially so as to shorten one's route: *the following aircraft cut across to join him*. ■ [no obj.] (cut across) have an effect regardless of (divisions or boundaries between groups): *subcultures which cut across national and political boundaries*. ■ [no obj.] (cut along) informal, dated leave or move hurriedly.

10 [no obj., often in imperative] stop filming or recording. ■ [with adverbial] move to another shot in a film: *cut to a dentist's surgery*. ■ [with obj.] make (a film) into a coherent whole by removing parts or placing them in a different order.

11 [no obj.] divide a pack of playing cards by lifting a portion from the top, either to reveal a card at random or to place the top portion under the bottom portion.

12 strike or kick (a ball) with an abrupt, typically downward motion: *Cook cut the ball back to him*.

■ Golf slice (the ball). ■ Cricket hit (the ball) to the off side with the bat held almost horizontally; play such a stroke against (the bowler). ■ [no obj.] Cricket (of the ball) turn sharply on pitching.

13 mix (an illegal drug) with another substance: *speed cut with rat poison*.

14 (cut it) N. Amer. informal come up to expectations; meet requirements: *this CD player doesn't quite cut it*. [shortened form of the idiom *cut the mustard*.]

▶ noun 1 an act of cutting, in particular: ■ [in sing.] a haircut: *his hair was in need of a cut*. ■ a stroke or blow given by a sharp-edged implement or by a whip or cane: *he could skin an animal with a single cut of the knife*. ■ a wounding remark or act. ■ [often with modifier] a reduction in amount or size: *she took a 20% pay cut* | *a cut in interest rates*. ■ Brit. a power

cut. ■ an act of cutting part of a book, play, etc.: *they would not publish the book unless the author was willing to make cuts*. ■ an immediate transition from one scene to another in a film. ■ Golf the halfway point of a golf tournament, where half of the players are eliminated. ■ Tennis & Cricket a stroke made with an abrupt, typically horizontal or downward action.

2 a result of cutting something, in particular: ■ a long, narrow incision in the skin made by something sharp: *blood ran from a cut on his jaw*. ■ a long, narrow opening or incision made in a surface or piece of material: *make a single cut along the top of each potato*. ■ a piece of meat cut from a carcass: *a good lean cut of beef*. ■ [in sing.] informal a share of the profits from something: *the directors are demanding their cut*. ■ a recording of a piece of music: *a cut from his forthcoming album*. ■ a version of a film after editing. ■ a passage cut or dug out, as a railway cutting or a new channel made for a river or other waterway. 3 [in sing.] the way or style in which something, especially a garment or someone's hair, is cut: *the elegant cut of his dinner jacket*.

– PHRASES **be cut out for (or to be)** [usu. with negative] informal have exactly the right qualities for a particular role or job: *I'm just not cut out to be a policeman*. **a cut above** informal noticeably superior to: *she's a cut above the rest*. **cut and dried** [often with negative] (of a situation) completely settled: *the championship is not as cut and dried as everyone thinks*. [early 18th cent.: originally used to distinguish the herbs of herbalists' shops from growing herbs.] **cut and paste** Computing move (text) by cutting it from one part of the text and inserting it in another. **cut and run** informal make a speedy departure from a difficult situation rather than deal with it. [originally a nautical phrase, meaning 'cut the anchor cable because of some emergency and make sail immediately'] **cut and thrust** a lively and competitive atmosphere or environment: *the cut and thrust of political debate*. ■ a situation or sphere of activity regarded as carried out under adversarial conditions: *the ruthless cut and thrust of the business world*. [originally a phrase in fencing.] **cut both ways** (of a point or statement) serve both sides of an argument. ■ (of an action or process) have both good and bad effects: *the triumphs of civilization cut both ways*. **cut the corner** take the shortest course by going across and not around a corner. **cut corners** do something perfunctorily so as to save time or money.

cut a dash Brit. be stylish or impressive in one's dress or behaviour. **cut someone dead** completely ignore someone. **cut a deal** N. Amer. informal come to an arrangement, especially in business; make a deal. **cut someone down to size** informal deflate someone's exaggerated sense of self-worth. **cut something down to size** reduce the size or power of something, for example an organization, which is regarded as having become too large or powerful. **cut a** —

figure present oneself or appear in a particular way: *David has cut a dashing figure on the international social scene*. **cut from the same cloth** of the same nature; similar. **cut in line** N. Amer. jump the queue.

cut it fine see FINE. **cut it out** [usu. in imperative] informal used to ask someone to stop doing or saying something that is annoying or offensive. **cut loose** distance or free oneself from a person, group, or system: *he was a young teenager, already cutting loose from his family*. ■ begin to act without restraint: *when Mannion cut loose the home side collapsed to 127 all out*. **cut someone/thing loose (or free)** free someone or something from something which holds or restricts them: *he'd cut loose the horses*. **cut one's losses** abandon an enterprise or course of action that is clearly going to be unprofitable or unsuccessful before one suffers more loss or harm. **cut the mustard** informal come up to expectations; reach the required standard: *I didn't cut the mustard as a hockey player*. **cut no ice** informal have no influence or effect: *your holier-than-thou attitude cuts no ice with me*. **cut someone off (or down) in their prime** bring someone's life or career to an abrupt end while they are at the peak of their abilities. **cut someone/thing short** interrupt someone or something; bring an abrupt or premature end to something said or done: *Peter cut him short rudely*. **cut someone to pieces** kill or severely injure someone. ■ totally defeat someone. **cut a (or the) rug** N. Amer. informal dance, especially in an energetic or accomplished way. **cut one's teeth** acquire initial practice or experience of a particular sphere of activity: *the brothers cut their professional teeth at Lusardi's before starting their own restaurant*. **cut a tooth** (of a baby) have a tooth appear through the gum. **cut to the chase** N. Amer. informal come to the point: *cut to the chase—what is it you want us to do?* [cut in the sense 'move

to another part of the film', expressing the notion of ignoring any preliminaries.] **cut up rough** Brit. informal behave in an aggressive, quarrelsome, or awkward way. **cut up well** archaic bequeath a large fortune. **cut your coat according to your cloth** proverb undertake only what you have the money or ability to do and no more. **have one's work cut out** see WORK. **make the cut** [usu. with negative] Golf equal or better a required score, thus avoiding elimination from the last two rounds of a four-round tournament. **miss the cut** Golf fail to equal or better a required score, thus being eliminated from the last two rounds of a four-round tournament.

– PHRASAL VERBS **cut in 1** interrupt someone while they are speaking: *'It's urgent,' Raoul cut in*. **2** pull in too closely in front of another vehicle after having overtaken it: *she cut in on a station wagon, forcing the driver to brake*. **3** (of a motor or other mechanical device) begin operating, especially when triggered automatically by an electrical signal. **4** dated interrupt a dancing couple to take over from one partner. **cut someone in** informal include someone in a deal and give them a share of the profits. **cut into** interrupt the course of: *Victoria's words cut into her thoughts*.

cut someone off 1 interrupt someone while they are speaking. ■ interrupt someone during a telephone call by breaking the connection. **2** prevent someone from receiving or being provided with something, especially power or water. **3** reject someone as one's heir; disinherit someone: *Gabrielle's family cut her off without a penny*. **4** prevent someone from having access to somewhere or someone; isolate someone from something they previously had connections with: *the couple were cut off by a fast-moving tide*. **cut out 1** (of a motor or engine) suddenly stop operating. **2** N. Amer. informal (of a person) leave quickly, especially so as to avoid a boring or awkward situation. **cut someone out** exclude someone: *his mother cut him out of her will*. **cut up 1** N. Amer. informal behave in a mischievous or unruly manner: *kids cutting up in a classroom*. **2** informal (of a horse race) have a particular selection of runners: *the race has cut up badly with no other opposition from England*. **cut someone up 1** informal (of a driver) overtake someone and pull in too closely in front of them. **2** N. Amer. informal criticize someone severely: *my kids cut him up about his appetite all the time*.

– ORIGIN Middle English (probably existing, although not recorded, in Old English); probably of Germanic origin and related to Norwegian *kutte* and Icelandic *kuta* 'cut with a small knife', *kuti* 'small blunt knife'. **cut-and-come-again** ▶ noun [usu. as modifier] a garden plant, especially a green vegetable or a flower, that can be repeatedly cut or harvested: *cut-and-come-again spinach*. **cut-and-cover** ▶ noun [mass noun] a method of building a tunnel by making a cutting which is then lined and covered over. **cutaneous** /kju:'teɪniəs/ ▶ adjective relating to or affecting the skin: *cutaneous pigmentation*. – ORIGIN late 16th cent.: from modern Latin *cutaneus* (from Latin *cutis* 'skin') + *-ous*.

cutaway ▶ noun [often as modifier] 1 a coat or jacket with the front cut away below the waist. **2** a diagram or drawing with some external parts left out to reveal the interior. **3** a shot or scene in a film which is of a different subject from those to which it is joined in editing.

cutback ▶ noun an act or instance of reducing something, especially expenditure: *cutbacks in defence spending*.

cutch /kʌtʃ/ ▶ noun See CATECHU.

cut-down ▶ adjective reduced in scope or length: *it's a cut-down version of a DTP program*.

cute ▶ adjective 1 attractive in a pretty or endearing way: *she had a cute little nose*. ■ N. Amer. informal sexually attractive. **2** N. Amer. informal clever or cunning, especially in a self-seeking or superficial way: *she had a real cute idea* | *the two brothers were cute enough to find a couple of rich women and marry them*.

– DERIVATIVES **cute** adverb, **cuteness** noun. – ORIGIN early 18th cent. (in the sense 'clever, shrewd'); shortening of *acute*.

cutesy ▶ adjective (*cutesier, cutesiest*) informal cute to a sentimental or mawkish extent: *the film's cutesy shots of children playing in the streets*.

cut glass ▶ noun [mass noun] 1 glass ornamented with patterns cut into it by grinding and polishing. **2** [as modifier] characterized by precise and careful enunciation: *a cut-glass accent*.

pidgin | Pierrot

- valves of the shell have a conspicuous gap between them and rough frontal ridges to aid in boring.
- *Pholas* and other genera, family *Pholadidae*.
 - ORIGIN mid 19th cent.: of unknown origin.
- pidgin** /'pidʒɪn/ ► **noun** [often as modifier] a grammatically simplified form of a language, typically English, Dutch, or Portuguese, some elements of which are taken from local languages, used for communication between people not sharing a common language.
- (**Pidgin**) another term for **Tok Pisin**.
 - [as modifier] denoting a simplified form of a language, especially as used by a non-native speaker: *we exchanged greetings, communicating in pidgin Spanish*.
 - ORIGIN late 19th cent.: Chinese alteration of English *business*.
- pidgin English** ► **noun** [mass noun] a pidgin in which the chief language is English, used originally between Chinese people and Europeans.
- pi-dog** ► **noun** variant spelling of **PYE-DOG**.
- pie** ► **noun** a baked dish of fruit, or meat and vegetables, typically with a top and base of pastry.
- PHRASES (as) — **as pie** informal very — *using the camera was as easy as pie*. (as) **nice (or sweet)** as **pie** extremely pleasant or polite. **a piece (or slice) of the pie** a share of an amount of money or business available to be claimed or distributed: *orchestras have seen cultural rivals get a bigger piece of the pie*. **pie in the sky** informal used to describe or refer to something that is pleasant to contemplate but is very unlikely to be realized.
 - ORIGIN Middle English: probably the same word as **PIE**, the various combinations of ingredients being compared to objects randomly collected by a magpie.
- pie** ► **noun** used in names of birds that resemble the magpie, especially in having black-and-white plumage, e.g. **tree pie**.
- ORIGIN Middle English: from Old French, from Latin *pica* 'magpie' (related to *picus* 'green woodpecker').
- pie** ► **noun** a former monetary unit of India and Pakistan, equal to one twelfth of an anna.
- ORIGIN from Hindi *pāī*, from Sanskrit *pada*, *padī* 'quarter'.
- piebald** ► **adjective** (of a horse) having irregular patches of two colours, typically black and white.
- **noun** a piebald horse.
 - ORIGIN late 16th cent.: from **PIE** (because of the magpie's black-and-white plumage) + **BALD** (in the obsolete sense 'streaked with white').
- piece** ► **noun** 1 a portion of an object or of material, produced by cutting, tearing, or breaking the whole: *a piece of cheese* | *the dish lay in pieces on the floor*. ■ an item used in constructing something: *take a car to pieces*. ■ an item forming part of a set: *a piece of luggage*. ■ a financial share: *each employee owns a piece of the company*. 2 a written, musical, or artistic creation: *a haunting piece of music*. 3 an instance or example: *a crucial piece of evidence*. 4 [with modifier] a coin of specified value: *a top piece*. 5 a figure or token used to make moves in a board game. ■ Chess a king, queen, bishop, knight, or rook, as opposed to a pawn. 6 informal, chiefly N. Amer. a firearm. 7 informal, offensive a woman. 8 Scottish a sandwich or other item of food taken as a snack.
- **verb** [with obj.] 1 (**piece something together**) assemble something from parts or pieces: *the dinosaur was pieced together from 119 bones*. ■ slowly make sense of something from separate pieces of evidence: *Daniel had pieced the story together from the radio*. 2 (**piece something out**) archaic extend something. 3 archaic patch (something).
 - PHRASES **a piece of ass (or tail)** vulgar slang a woman regarded as sexually attractive. **a piece of cake** see **CAKE**. **a piece (or slice) of the action** informal a share in an exciting or profitable enterprise. **come (or fall) to pieces** break into parts or become damaged: *it splintered loudly and fell to pieces under his weight*. **go to pieces** become so upset or nervous that one is unable to function normally. **in one piece** unharmed or undamaged, especially after a dangerous experience. (all) of a piece (entirely) consistent. **piece by piece** in gradual stages. **piece of water** a small lake or pond. **piece of work** informal a person of a specified kind, especially an unpleasant one: *he's a nasty piece of work*. **say one's piece** give one's opinion or make a prepared statement. **tear (or pull) someone/thing to pieces** criticize someone or something harshly.

- ORIGIN Middle English: from Old French *piece* (compare with medieval Latin *pecia*, *petium*), of obscure ultimate origin.
- pièce de résistance** /pjɛs də rezistɑ̃s/, French /pjɛs də rezistɑ̃s/ ► **noun** [in sing.] (especially with reference to creative work) the most important or remarkable feature: *the pièce de résistance of the meal was flaming ice cream*.
- ORIGIN French, literally 'piece (i.e. means) of resistance'.
- piece-dyed** ► **adjective** (of fabric) dyed after being woven.
- piece goods** ► **plural noun** fabrics woven in standard lengths for sale.
- piecemeal** ► **adjective & adverb** characterized by unsystematic partial measures taken over a period of time: [as adj.] *the village is slowly being killed off by piecemeal development* | [as adv.] *many organizations have been built up piecemeal*.
- ORIGIN Middle English: from the noun **PIECE** + *-meal* from Old English *mælum*, in the sense 'measure, quantity taken at one time'.
- piece of eight** ► **noun** historical a Spanish dollar, equivalent to 8 reals.
- piecer** ► **noun** a person who pieces something together or patches something up. ■ historical a person, often a child, employed in a spinning mill to join the ends of broken threads.
- piece rate** ► **noun** a rate of payment for piecework.
- piecework** ► **noun** [mass noun] work paid for according to the amount produced.
- DERIVATIVES **pieceworker** **noun**.
- pie chart** ► **noun** a type of graph in which a circle is divided into sectors that each represent a proportion of the whole.
- ORIGIN 1920s: because of the resemblance of the graph to a pie divided into portions.
- pie crust** ► **noun** the baked pastry crust of a pie.
- [mass noun] N. Amer. shortcrust pastry.
- piecrust table** ► **noun** a table with an indented edge like a piecrust.
- pie** /paɪd/ ► **adjective** having two or more different colours: *the pied flycatcher*.
- ORIGIN Middle English (originally in the sense 'black and white like a magpie'): from **PIE** + *-ed*.
- pied-à-terre** /pjɛdɑː'tɛr/, French /pjɛtɑːr/ ► **noun** (pl. **pieds-à-terre** pronunc. **same**) a small flat, house, or room kept for occasional use.
- ORIGIN early 19th cent.: French, literally 'foot to earth'.
- Piedfort** /'pjɛrfɔːt/ ► **noun** a coin that is thicker than a normal issue, made as a collector's item.
- ORIGIN from French *pied* 'foot' + *fort* 'strong'.
- Piedmont** /'pjɛdmɒnt/ 1 a region of NW Italy, in the foothills of the Alps; capital, Turin. Dominated by Savoy from 1400, it became a part of the kingdom of Sardinia in 1720. It was the centre of the movement for a united Italy in the 19th century. Italian name **PIEMONTE**. 2 a hilly region of the eastern US, between the Appalachians and the coastal plain.
- DERIVATIVES **Piedmontese** **noun & adjective**.
 - ORIGIN from Italian *piemonte* 'mountain foot'.
- piedmont** ► **noun** a gentle slope leading from the foot of mountains to a region of flat land.
- ORIGIN mid 19th cent.: from Italian *piemonte* 'mountain foot' (see **PIEDMONT**).
- pied noir** /pjɛr 'nwɑː/, French /pjɛ nwar/ ► **noun** (pl. **pieds noirs** pronunc. **same**) a person of European origin who lived in Algeria during French rule, especially one who returned to Europe after Algeria was granted independence.
- ORIGIN French, literally 'black foot', so named because of the western-style black leather shoes worn by the first colonists.
- pie-dog** ► **noun** variant spelling of **PYE-DOG**.
- Pied Piper** the hero of *The Pied Piper of Hamelin*, a poem by Robert Browning (1842), based on an old German legend. The piper, dressed in particoloured costume, rid the town of Hamelin (Hameln) in Brunswick of rats by enticing them away with his music, and when refused the promised payment he lured away the town's children in the same manner.
- (as **noun** a **Pied Piper**) a person who entices people to follow them in a particular course of action.
- pied wagtail** ► **noun** a bird of a black-and-white race of the white wagtail, found in the British Isles,

- Spain, and Morocco. ● *Motacilla alba yarrelli*, family Motacillidae.
- pie-eyed** ► **adjective** informal very drunk.
- pie-faced** ► **adjective** informal having a roundish face and typically a blank or stupid expression.
- Piegan** ► **noun** (pl. **same** or **Piegans**) & **adjective** variant spelling of **PEIGAN**.
- pieman** ► **noun** (pl. **piemen**) archaic a pie seller.
- Piemonte** /pjɛ'mɒnte/ Italian name for **PIEDMONT**.
- piemontite** /'pi:mɒntaɪt/ ► **noun** [mass noun] a brown or black mineral consisting of a silicate of calcium, aluminium, iron, and manganese.
- ORIGIN late 19th cent.: from Italian *Piemonte* (see **PIEDMONT**) + *-ite*.
- pie plate** (also **pie pan**) ► **noun** a shallow metal or glass dish with sloping sides in which pies are baked.
- pier** ► **noun** 1 a platform on pillars projecting from the shore into the sea, typically incorporating entertainment arcades and places to eat. ■ a structure projecting from the shore into a river, lake, or the sea, used as a landing stage for boats. ■ a breakwater or mole. 2 Brit a long, narrow structure projecting from an airport terminal, giving passengers access to an aircraft. 3 a solid support designed to sustain vertical pressure, in particular: ■ the pillar of an arch or supporting a bridge. ■ a wall between windows or other adjacent openings.
- ORIGIN Middle English: from medieval Latin *pera*, of unknown origin.
- Pierce**, Franklin (1804–69), American Democratic statesman, 14th President of the US 1853–7.
- pierce** ► **verb** [with obj.] 1 (of a sharp pointed object) go into or through (something): *a splinter had pierced the skin*. ■ make (a hole) with a sharp instrument. ■ make a hole in (the ears or other part of the body) so as to wear jewellery in them: (as adj. **pierced**) *a punk with a pierced nose*. ■ make an opening in or bore a tunnel through: *the dividing wall is pierced by arches*. 2 force a way through; penetrate: *they were seeking to pierce the anti-ballistic-missile defences* | *a shrill voice pierced the air*.
- DERIVATIVES **piercer** **noun**.
 - ORIGIN Middle English: from Old French *percer*, based on Latin *pertus* 'bored through', from the verb *pertundere*, from *per* 'through' + *tundere* 'thrust'.
- piercing** ► **adjective** having or showing shrewdness or keen intelligence: *her piercing analysis* | *a tall blonde with piercing eyes*. ■ (of a sound) extremely high or loud: *she let out a piercing scream*. ■ (of wind or extreme cold) seeming to cut through one. ■ (of a feeling) intense, typically in a distressing way.
- **noun** (usu. **piercings**) holes in parts of the body, typically other than the ears, made so as to wear rings, studs, or other jewellery in them.
 - DERIVATIVES **piercingly** **adverb**.
- pier glass** ► **noun** a large mirror, used originally to fill wall space between windows.
- pierid** /'paɪərɪd/ ► **noun** Entomology a butterfly of a family (Pieridae) which includes the whites, brimstones, and sulphurs.
- ORIGIN late 19th cent.: from modern Latin *Pieridae* (plural), from Latin *pieris* 'Muse'.
- pieris** /'paɪrɪs, 'paɪ-/ ► **noun** an evergreen shrub of the heather family, typically having pink or red young leaves and loose clusters of waxy white bell-shaped flowers. It is native to North America and Asia.
- Genus *Pieris*, family *Ericaceae*.
 - ORIGIN modern Latin, from Latin, literally 'Muse', from *Pieria*, the name of a district in northern Thessaly, said to be the home of the Muses.
- Piero della Francesca** /pjɛrɔː dələ frən'tjeskə/ (1416–92), Italian painter. He used perspective, proportion, and geometrical relationships to create ordered and harmonious pictures in which the figures appear to inhabit real space. He is best known for his frescoes, notably a cycle in Arezzo depicting the story of the True Cross (begun 1452).
- pierogi** /'paɪrəʊgi/ (also **perogi**, **pirog**, or **pierogies**) ► **plural noun** N. Amer. dough dumplings stuffed with a filling such as potato or cheese, typically served with onions or sour cream.
- ORIGIN from Polish *pieróg* or Ukrainian *pyrih*.
- Pierre** /piə/ the state capital of South Dakota, situated on the Missouri River; pop. 13,899 (est. 2008).
- Pierrot** /'piərəʊ, 'pjɛrəʊ/ ► **noun** a stock male character in French pantomime, with a sad white-painted face, a loose white costume, and a pointed hat.

shape memory ▶ noun [mass noun] Metallurgy a property exhibited by certain alloys of recovering their initial shape when they are heated after having been plastically deformed.

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share ▶ noun 1 a part or portion of a larger amount which is divided among a number of people, or to which a number of people contribute: *under the proposals, investors would pay a greater share of the annual fees required* | *we gave them all the chance to have a share in the profits.* ■ each of the notional parts into which property held by joint owners is divided: *Jake had a share in a large, seagoing vessel.* ■ [in sing.] the allotted or due amount of something that a person expects to have or to do, or that is expected to be accepted or done by them: *she's done more than her fair share of globetrotting.* ■ [in sing.] a person's part in or contribution to something: *she can't take a share in childcare — she's a nervous wreck.* 2 one of the equal parts into which a company's capital is divided, entitling the holder to a proportion of the profits: *he's selling his shares in BT.*

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Sharjah /ʃɑːdʒə/ one of the seven member states of the United Arab Emirates; pop. 934,400 (est. 2009). Arabic name **ASH SHARIQAH**. ■ its capital city, situated on the Persian Gulf; pop. 845,600 (est. 2009).

shark ▶ noun 1 a long-bodied chiefly marine fish with a cartilaginous skeleton, a prominent dorsal fin, and tooth-like scales. Most sharks are predatory, though the largest kinds feed on plankton, and some can grow to a large size. ■ Several orders (or superorders) of the subclass Elasmobranchii: many families. 2 a small SE Asian freshwater fish with a shark-like tail, popular in aquaria. ■ Two species in the family Cyprinidae: the small **red-tailed black shark** (*Labeo bicolor*), and the larger **black shark** (*Morulus chrysophekadion*). 3 a light greyish brown European moth, the male of which has pale silvery hindwings. ■ *Genus Cucullia*, family Noctuidae: several species.

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shark-sucker ▶ noun another term for **REMORA**.

Sharon /'ʃɑːrən/ a fertile coastal plain in Israel, lying between the Mediterranean Sea and the hills of Samaria.

Sharon /'ʃɑːrən/, Ariel (b.1928), Israeli general and Likud statesman, Prime Minister 2001–6.

sharon fruit /'ʃɑːrən/, 'ʃɑːrən/ ▶ noun a persimmon, especially one of an early-fruiting orange variety grown in Israel.

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Sharp, Cecil (James) (1859–1924), English collector of folk songs and folk dances. From 1904 onwards he published a number of collections of songs and dances, stimulating a revival of interest in English folk music. Sharp also founded the English Folk Dance Society in 1911.

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4 (of an action or change) sudden and marked: *there was a sharp increase in interest rates* | *he heard her sharp intake of breath.* ■ (of a bend, angle, or turn) making a sudden change of direction: *the bus creaked round a sharp hairpin bend.*

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▶ noun 1 a musical note raised a semitone above natural pitch. ■ the sign (#) indicating this. 2 a long, sharply pointed needle used for general sewing. ■ (usu. **sharps**) a thing with a sharp edge, such as a blade or a fragment of glass: *the safe disposal of sharps and clinical waste.* 3 informal a swindler or cheat. See also **CARD SHARP**.

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Sharpeville massacre the killing of sixty-nine anti-apartheid demonstrators by security forces at Sharpeville, a black township south of Johannesburg, on 21 March 1960. Following the massacre, the South African government banned the African National Congress and the Pan-Africanist Congress.

sharp-eyed ▶ adjective quick to notice things; observant: *sharp-eyed readers may have already spotted this.*

sharp-featured ▶ adjective (of a person) having well-defined facial features.

sharpie ▶ noun (pl. **sharpies**) 1 a sharp-prowed, flat-bottomed New England sailing boat, with one or two masts each rigged with a triangular sail. 2 informal, chiefly N. Amer. another term for **SHARPER**.

3 Austral. informal (in the 1960s and 1970s) a young person resembling a skinhead, with close-cropped hair and distinctive dress.

sharpish ▶ adjective fairly sharp.

▶ adverb Brit. quickly; soon: *I'd slip away sharpish if I were you.*

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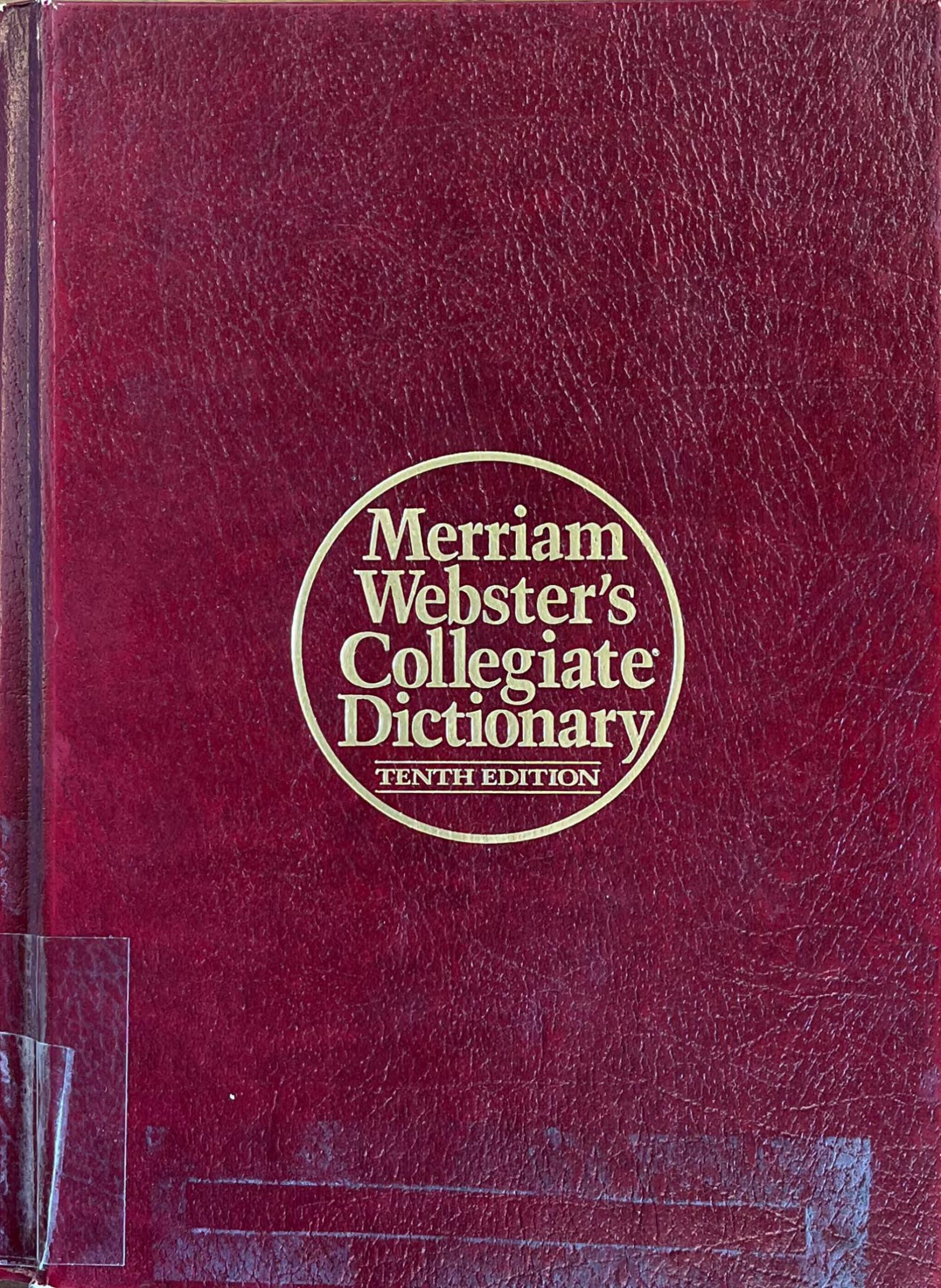
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its direction of motion **c**: an ornamental pointed projection formed by or arising from the intersection of two arcs or foils **d** (1): a point on the grinding surface of a tooth (2): a fold or flap of a cardiac valve **e**: a point of transition (as from one astrological sign to another or one historical period to the next): TURNING POINT, also: EDGE, VERGE (on the ~ of stardom) — **cus-pate** \kəs-pāt, -pət/ *adj* — **cusped** \kəspəd/ *adj*

cuspid \kəs-pəd/ *n* [bicuspid] (1878): CANINE 1
cuspidate \kəs-pə-dāt/ *adj* [L *cuspidatus*, pp. of *cuspidare* to make pointed, fr. *cuspid-*, *cuspid* point] (1692): having a cusp: terminating in a point (a ~ leaf) (~ molar)

cuspidation \kəs-pə-dā-shən/ *n* (1848): decoration with cusps
cuspidor \kəs-pə-dōr, -dōr/ *n* [Pg *cuspidouro* place for spitting, fr. *cuspir* to spit, fr. *conspuere*, fr. *com-* + *spuere* to spit — more at SPEW] (1735): SPITTOON

cuss \kəs/ *n* [alter. of *curse*] (1775) 1: FELLOW 4c 2: CURSE 1, 2
cuss *vb* (1815): CURSE — **cuss-er** *n*
cussed \kəs-səd/ *adj* (1840) 1: CURSED 2: OBSTINATE, CANTANKEROUS — **cussed-ly** *adv* — **cuss-ed-ness** \-nəs/ *n*

cuss-word \kəs-wōrd/ *n* (1872) 1: SWEARWORD 2: a term of abuse: a derogatory term

cus-tard \kəs-tərd/ *n* [ME, a kind of pie, alter. of *crustarde*, *crustade*, prob. fr. (assumed) AF *crustade*, fr. OF *crouste* crust, fr. L *crusta* — more at CRUST] (1740): a pudding-like usu. sweetened mixture made with eggs and milk — **cus-tardy** \-tərdē/ *adj*

custard apple (1657) 1: a: any of several chiefly tropical American soft-fleshed edible fruits **b**: any of a genus (*Annona* of the family Annonaceae, the custard-apple family) of trees or shrubs bearing this fruit; esp.: a small West Indian tree (*A. reticulata*) 2: PAPAWE

cus-to-dial \kəs-tō-dē-əl/ *adj* (1772): relating to guardianship; specif.: marked by or given to watching and protecting rather than seeking to cure (~ care)

cus-to-dian \kəs-tō-dē-ən/ *n* (1781): one that guards and protects or maintains; esp.: one entrusted with guarding and keeping property or records or with custody or guardianship of prisoners or inmates — **cus-to-dian-ship** \-ship/ *n*

cus-to-dy \kəs-tō-dē/ *n*, *pl* -dies [ME *custodie*, fr. L *custodia* guarding, fr. *custod-*, *custos* guardian] (15c): immediate charge and control (as over a ward or a suspect) exercised by a person or an authority; also: SAFEKEEPING

cus-tom \kəs-təm/ *n* [ME *custume*, fr. OF, fr. L *consuetudo*, *consuetudo*, fr. *consuere* to accustom, fr. *com-* + *suescere* to accustom; akin to *sua* one's own — more at SUICIDE] (13c) 1: a: a usage or practice common to many or to a particular place or class or habitual with an individual **b**: long-established practice considered as unwritten law **c**: repeated practice **d**: the whole body of usages, practices, or conventions that regulate social life 2 *pl* **a**: duties, tolls, or imposts imposed by the sovereign law of a country on imports or exports **b** *usu* *sing* *in constr*: the agency, establishment, or procedure for collecting such customs 3 **a**: business patronage **b**: usu. habitual patrons: CUSTOMERS *syn* see HABIT

custom *adj* (1830) 1: made or performed according to personal order 2: specializing in custom work or operation (a ~ tailor)

cus-tom-ary \kəs-tə-mer-ē/ *adj* (1535) 1: based on or established by custom 2: commonly practiced, used, or observed *syn* see USUAL — **cus-tom-ar-i-ly** \kəs-tə-mer-ē-lē/ *adv* — **cus-tom-ar-i-ness** \kəs-tə-mer-ē-nəs/ *n*

cus-tom-built \kəs-təm-bilt/ *adj* (1925): built to individual specifications

cus-tom-er \kəs-tə-mər/ *n* [ME *customer*, fr. *custume*] (15c) 1: one that purchases a commodity or service 2: an individual usu. having some specified distinctive trait (a real tough ~)

cus-tom-house \kəs-təm-haʊs/ *also* **cus-toms-house** \-təmz-/ *n* (15c): a building where customs and duties are paid or collected and where vessels are entered and cleared

cus-tom-ize *Brit var* of CUSTOMIZE

cus-tom-ize \kəs-tə-mīz/ *vi* -ized; -iz-ing (1926): to build, fit, or alter according to individual specifications — **cus-tom-iz-er** *n*

cus-tom-made \kəs-tə(m)-mād/ *adj* (1855): made to individual specifications

cus-tom-tailor \-tā-lər/ *vt* (1895): to alter, plan, or build according to individual specifications or needs

cut \kət/ *vb* **cut**; **cut-ting** [ME *cuten*] *vi* (13c) 1: **a**: to penetrate with or as if with an edged instrument **b**: to hurt the feelings of **c**: to strike sharply with a cutting effect **d**: to strike (a ball) with a glancing blow that imparts a reverse spin **e**: to experience the growth of (a tooth) through the gum 2 **a**: TRIM, PARE (~ one's nails) **b**: to shorten by omissions **c**: DISSOLVE, DILUTE, ADULTERATE **d**: to reduce in amount (~ costs) 3 **a**: MOW, REAP **b** (1): to divide into parts with an edged tool (~ bread) (2): FELL, HEW **c** (1): to separate or discharge from an organization: DETACH (2): to single out and isolate (~ a calf out from the herd) **d**: to change the direction of sharply **e**: to go or pass around or about 4 **a**: to divide into segments **b**: INTERSECT, CROSS **c**: BREAK, INTERRUPT (~ our supply lines) **d** (1): to divide (a deck of cards) into two portions (2): to draw (a card) from the deck **e**: to divide into shares: SPLIT 5 **a**: to make by or as if by cutting: as (1): CARVE (~ stone) (2): to shape by grinding (~ a diamond) (3): ENGRAVE (4): to shear or hollow out **b**: to record sounds (as speech or music) on (~ a record) **c**: to type on a stencil 6 **a**: STOP, CEASE (~ the nonsense) **b**: to refuse to recognize (an acquaintance): OSTRACIZE **c**: to absent oneself from (as a class) **d**: to stop (a motor) by opening a switch **e**: to stop the filming of (a motion-picture scene) 7 **a**: to engage in (a frolicsome or mischievous action) (on summer nights strange capers are ~ under the thin guise of a Christian festival — D. C. Peattie) **b**: to give the appearance or impression of (~ a fine figure) 8: to be able to manage or handle — *usu.* used in negative constructions (can't ~ that kind of work anymore) ~ *vi* 1: to function as or as if as an edged tool **b**: to undergo incision or severance (cheese ~s easily) **c**: to perform the operation of dividing, severing, incising, or intersecting **d**: to make a stroke with a whip, sword, or other weapon **e**: to wound feelings or sensibilities **f**: to cause constriction or chafing **g**: to be of effect, influence, or significance (an analysis that ~s deep) 2 **a** (1): to divide a pack of cards esp. in order to decide the deal or settle a

bet (2): to draw a card from the pack **b**: to divide spoils: SPLIT 3 **a**: to proceed obliquely from a straight course (~ across the yard) **b**: to move swiftly (a yacht cutting through the water) **c**: to describe an oblique or diagonal line **d**: to change sharply in direction: SWERVE **e**: to make an abrupt transition from one sound or image to another in motion pictures, radio, or television 4: to stop photographing motion pictures — **cut a deal**: to negotiate an agreement — **cut both ways**: to have both favorable and unfavorable results or implications — **cut corners**: to perform some action in the quickest, easiest, or cheapest way — **cut ice**: to be of importance — *usu.* used in negative constructions — **cut it**: to cut the mustard — **cut the mustard**: to achieve the standard of performance necessary for success

cut *n* (1548) 1: a product of cutting: as **a**: a creek, channel, or inlet made by excavation or worn by natural action **b** (1): an opening made with an edged instrument (2): a wound made by something sharp: GASH **c**: a surface or outline left by cutting **d**: a passage cut as a roadway **e**: a grade or step esp. in a social scale (a ~ above the ordinary) **f**: a subset of a set such that when it is subtracted from the set the remainder is not connected **g**: a pictorial illustration **h**: TRACK 1e(2) 2: the act or an instance of cutting: as **a**: a gesture or expression that hurts the feelings (made an unkind ~) **b**: a straight passage or course **c**: a stroke or blow with the edge of a knife or other edged tool **d**: a lash with or as if with a whip **e**: the act of reducing or removing a part (a ~ in pay) **f**: an act or turn of cutting cards; also: the result of cutting **g**: the elimination of part of a large field from further competition (as in a golf tournament) — often used with *miss* or *make* to denote respectively being or not being among those eliminated (played poorly and missed the ~) 3: something that is cut or cut off: as **a**: a length of cloth varying from 40 to 100 yards (36.6 to 91.4 meters) **b**: the yield of products cut esp. during one harvest **c**: a segment or section of a meat carcass or a part of one **d**: a group of animals selected from a herd **e**: SHARE (took his ~ of the profits) 4: a voluntary absence from a class 5 **a**: a stroke that cuts a ball; also: the spin imparted by such a stroke **b**: a swing by a batter at a pitched baseball **c**: an exchange of captures in checkers 6: an abrupt transition from one sound or image to another in motion pictures, radio, or television 7 **a**: the shape and style in which a thing is cut, formed, or made (clothes of the latest ~) **b**: PATTERN, TYPE **c**: HAIRCUT — **cut of one's jib**: APPEARANCE, STYLE

cut-abil-i-ty \kət-ə-bi-lə-tē/ *n* (1965): the proportion of lean salable meat yielded by a carcass

cut-and-dried \kət-ən-drid/ *also* **cut-and-dry** \-dri/ *adj* (1710): being or done according to a plan, set procedure, or formula: ROUTINE

cut-and-paste \-päst/ *adj* (1953): pieced together by excerpting and combining passages from many sources (the book was a ~ job)

cut-and-try \-tri/ *adj* (1903): marked by experimental procedure: EMPIRICAL

cu-ta-ne-ous \kyū-tā-nē-əs/ *adj* [NL *cutaneus*, fr. L *cutis* skin — more at HIDE] (1578): of, relating to, or affecting the skin — **cu-ta-ne-ous-ly** *adv*

cut-away \kə-tə-wā/ *adj* (1841): having or showing parts cut away

cutaway *n* (1849) 1: a coat with skirts tapering from the front waistline to form tails at the back 2 **a**: a cutaway picture or representation **b**: a shot that interrupts the main action of a film or television program to take up a related subject or to depict action supposed to be going on at the same time as the main action 3: a back dive in which the head is lowered toward the board after the takeoff

cut-back \kət-bak/ *n* (1897) 1: something cut back 2: REDUCTION **cut back** *vi* (1871): to shorten by cutting: PRUNE ~ *vi* 1: to interrupt the sequence of a plot (as of a movie) by introducing events prior to those last presented 2: CUT DOWN (cut back on sugar)

cutch \kəch/ *n* [modif. of Malay *kachu*] (1759): CATECHU

cut down *vi* (1821) 1 **a**: to strike down and kill or incapacitate **b**: KNOCK DOWN 2 **a**: to remodel by removing extras or unwanted furnishings and fittings **b**: to remake in a smaller size ~ *vi*: to reduce or curtail volume or activity (cut down on smoking) — **cut down to size**: to reduce from an inflated or exaggerated importance to true or suitable stature

cute \kyūt/ *adj* **cut-er**; **cut-est** [short for *acute*] (ca. 1731) 1 **a**: clever or shrewd often in an underhanded manner **b**: IMPERTINENT, SMART-ALECKY (don't get ~ with me) 2: attractive or pretty esp. in a dainty or delicate way 3: obviously straining for effect — **cute-ly** *adv* — **cute-ness** *n*

cute-sy \kyūt-sē/ *adj* **cute-si-er**; **-est** [cute + -sy (as in folksy)] (1914): self-consciously or excessively cute

cut glass *n* (1800): glass ornamented with patterns cut into its surface by an abrasive wheel and polished

cut-grass \kət-gras/ *n* (ca. 1818): a grass (esp. genus *Leersia*) with minute hooked bristles along the edges of the leaf blade

cu-ti-cle \kyū-ti-kəl/ *n* [L *cuticula*, dim. of *cutis* skin — more at HIDE] (1615) 1: SKIN, PELLICLE as **a**: an external investment (as of an insect) secreted usu. by epidermal cells **b**: the outermost layer of animal integument (as in humans) when composed of epidermis **c**: a thin continuous fatty or waxy film on the external surface of many higher plants that consists chiefly of cutin 2: dead or horny epidermis — **cu-ti-cu-lar** \kyū-ti-kyə-lər/ *adj*

cut-ie or **cut-ey** \kyū-tē/ *n*, *pl* **cut-ies** or **cut-eyes** [cute + -ie] (1908): an attractive person; esp.: a pretty girl

cu-tin \kyū-tin/ *n* [ISV, fr. L *cutis*] (ca. 1872): an insoluble mixture containing waxes, fatty acids, soaps, and resinous material that forms a continuous layer on the outer epidermal wall of a plant

cut-in \kət-in/ *n* (1883): something cut in — **cut-in** *adj*

cut in *vi* (1612) 1: to thrust oneself into a position between others or belonging to another 2: to join in something suddenly (cut in on the conversation) 3: to interrupt a dancing couple and take one as one's partner 4: to become automatically connected or started in operation ~ *vt* 1: to mix with cutting motions (after sifting the flour into a mixing bowl, cut the lard in) 2: to introduce into a number, group, or sequence 3: to connect into an electrical circuit to a mechanical apparatus so as to permit operation 4: to include esp. among those benefiting or favored (cut them in on the profits)

pidgin English *n.*, often *cap P* [Chinese Pidgin English *pidgin* business] (1859): an English-based pidgin; *esp*: one orig. used in parts of the Orient

pie \pi-/ *n* [ME, fr. OF, fr. L *pica*; akin to L *picus* woodpecker, OHG *speh*] (13c): MAGPIE

pie *n* [ME] (14c) 1: a meat dish baked with biscuit or pastry crust — compare POTPIE 2: a dessert consisting of a filling (as of fruit or custard) in a pastry shell or topped with pastry or both 3 a: AFFAIR, BUSINESS (she wanted her finger ... in every possible social ~ — Mary Deasy) b: a whole regarded as divisible into shares (giving the less fortunate ... a larger share of the economic ~ — R. M. Hutchins)

pie *var* of *PI*

pie-bald \pi-'bald/ *adj* (1594) 1: of different colors; *esp*: spotted or blotched with black and white 2: composed of incongruous parts

piebald *n* (1765): a piebald animal (as a horse)

piece \pes/ *n* [ME, fr. OF, fr. (assumed) VL *pettia*, of Gaulish origin; akin to W *peh* thing] (13c) 1: a part of a whole: as a: FRAGMENT (<~s of broken glass) b: any of the individual members comprising a unit — often used in combination (a five-piece band) (a three-piece suit) 2: an object or individual regarded as a unit of a kind or class (a ~ of fruit) 3: a short distance (down the road a ~) 4: a standard quantity (as of length, weight, or size) in which something is made or sold 5: a literary, journalistic, artistic, dramatic, or musical composition 6: FIREARM 7: COIN; also: TOKEN 8: a man used in playing a board game; *specif*: a chessman of superior rank 9: OPINION, VIEW (spoke his ~) 10 a *usu vulgar*: an act of copulation b *usu vulgar*: the female partner in sexual intercourse *syn* see PART — of a piece: ALIKE, CONSISTENT — piece of one's mind: a severe scolding: TONGUE-LASHING — piece of the action: a share in activity or profit — to pieces 1: without reserve or restraint: COMPLETELY 2: into fragments; also: into component parts 3: out of control (went to pieces from shock)

piece *vt* **pieced**; **piecing** (15c) 1: to repair, renew, or complete by adding pieces: PATCH 2: to join into a whole — often used with *together* (his new book ... has been pieced together from talks — Merle Miller) — **piecer** *n*

piece by piece *adv* (1560): by degrees: PIECEMEAL

pièce de résistance \pe-'es-də-'rə-'zē-'stān(t)s, -rā-, -'stāns/ *n*, pl **pièces de résistance** [F, lit., piece of resistance] (1839) 1: the chief dish of a meal 2: an outstanding item or event: SHOWPIECE

piece-dye \pes-'di/ *vt* (1920): to dye after weaving or knitting

piece goods *n* *pl* (1665): cloth fabrics sold from the bolt at retail in lengths specified by the customer — called also *yard goods*

piece-meal \pes-'mēl, -'mē(ə)/ *adv* (14c) 1: one piece at a time: GRADUALLY 2: in pieces or fragments: APART

piecemeal *adj* (1600): done, made, or accomplished piece by piece or in a fragmentary way (<~ reforms in the system)

piece of cake (1936): something easily done: CINCIN, BREEZE

piece of eight (1610): an old Spanish peso of eight reals

piece of work (1928): a complicated, difficult, or eccentric person

piece-wise \pes-'wīz/ *adv* (1674): with respect to a number of discrete intervals, sets, or pieces (<~ continuous functions)

piece-work \-wɜrk/ *n* (1549): work done by the piece and paid for at a set rate per unit — **piece-work-er** \-wɜrk-kər/ *n*

pie chart *n* (1922): a circular chart cut by radii into segments illustrating relative magnitudes or frequencies — called also *circle graph*

pie-crust \pi-'krast/ *n* (1582): the pastry shell of a pie

pie'd \pi'd/ *adj* (14c): of two or more colors in blotches; also: wearing or having a parti-colored coat (a ~ horse)

pie'd past and past part of PI or of PIE

pie'd-à-terre \pe-'ād-ə-'ter, -'ād-ā-, -'pyā-dā-/ *n*, pl **pie'ds-à-terre** [F, lit., foot to the ground] (1829): a temporary or second lodging

pie'd-mont \pe'd-'mānt/ *adj* [Piedmont, region of Italy] (1855): lying or formed at the base of mountains — **pie'dmont** *n*

pie'd piper *n*, often *cap both Ps* [the *Pied Piper*, hero of a German folktale who charmed the rats of Hameln, Germany, into a river] (1925) 1: one that offers strong but delusive enticement 2: a leader who makes irresponsible promises 3: a charismatic person who attracts followers

pie-eyed \pi-'i'd/ *adj* (1904): INTOXICATED

pie-faced \-fəst/ *adj* (ca. 1912): having a round, smooth, or blank face

pieing *pres part of PI or of PIE*

pie in the sky (1911): an unrealistic enterprise or prospect of prosperity — **pie-in-the-sky** *adj*

pie-plant \pi-'plant/ *n* (ca. 1847): garden rhubarb

pier \pi-/ *n* [ME *per*, fr. OE, fr. ML *pera*] (12c) 1: an intermediate support for the adjacent ends of two bridge spans 2: a structure (as a breakwater) extending into navigable water for use as a landing place or promenade or to protect or form a harbor 3: a vertical structural support: as a: the wall between two openings b: PILLAR, PILASTER c: a vertical member that supports the end of an arch or lintel d: an auxiliary mass of masonry used to stiffen a wall 4: a structural mount (as for a telescope) *usu*: of stonework, concrete, or steel

perce \pi-'s/ *vb* **pierced**; **piercing** [ME *percen*, fr. OF *percer*, fr. (assumed) VL *perusiare*, fr. L *pertusus*, pp. of *pertundere* to perforate, fr. *per-* through + *tundere* to beat — more at *PER-*, CONTUSION] *vt* (14c) 1 a: to run into or through as a pointed weapon does: STAB b: to enter or thrust into sharply or painfully 2: to make a hole through: PERFORATE 3: to force or make a way into or through 4: to penetrate with the eye or mind: DISCERN 5: to penetrate so as to move or touch the emotions of ~ *vi*: to force a way into or through something *syn* see ENTER

pierced *adj* (14c) 1: having holes; *esp*: decorated with perforations 2: having the earlobe punctured for an earring (<~ ears) 3: designed for pierced ears (<~ earrings)

piercing *adj* (14c): PENETRATING: as a: LOUD, SHRILL (<~ cries) b: PERCEPTIVE (<~ eyes) c: penetratingly cold: BITING (<~ a wind) d: CUTTING, INCISIVE (<~ sarcasm) — **piercing-ly** \pi-'sɪŋ-lē/ *adv*

pier glass *n* (1703): a large high mirror; *esp*: one designed to occupy the wall space between windows — called also *pier mirror*

Pierian \pi-'i-ən, -'er-/ *adj* (1591) 1: of or relating to the region of Pieria in ancient Macedonia or to the Muses who were once worshiped there 2: of or relating to learning or poetry

pie-ro-gi also **pi-ro-gi** \pə-'rō-gē, pi-/ *n*, pl **-gi** also **-gies** [Pol. *pieróg* dumpling, *pierogi*] (1927): a case of dough filled with a filling (as of meat, cheese, or vegetables) and cooked by boiling then panfrying

Pier-rot \pe-'rō-/ *n* [F, dim. of *Pierre* Peter] (ca. 1770): a stock character of old French pantomime *usu*: having a whitened face wearing loose white clothes

pier table *n* (1803): a table to be placed under a pier glass

pies *pl* of *PI* or of *PIE*

pie safe *n* (1951): a cupboard whose doors have decorative tin panels for ventilation

pie-tà \pe-(j)ā-'tā, pyā-/ *n*, often *cap* [It, lit., pity, fr. L *pietas* piety] (1644): a representation of the Virgin Mary mourning over the body of Christ

pie-tism \pi-'ti-zəm/ *n* (1697) 1 *cap*: a 17th century religious movement originating in Germany in reaction to formalism and stressing Bible study and personal religious experience 2: emphasis on devotional experience and practices b: affectation of devotion — **pie-tist** \pi-'ti-tist/ *adj* or *n*, often *cap*

pie-tis-tic \pi-'ti-tik/ *adj* (1830) 1: of or relating to Pietism 2: or relating to religious devotion or devout persons b: marked by overly sentimental or emotional devotion to religion: RELIGIOUS

pie-tis-ti-cal-ly \ti-'k(ə)-lē/ *adv*

pie-ty \pi-'ti-/ *n*, pl **pie-ties** [F *piété* piety, pity, fr. L *pietas*: piety] (1565) 1: the quality or state of being pious: fidelity to natural obligations (as to parents) b: dutifulness in religion: DEVOUTNESS 2: an act inspired by piety 3: a conventional belief or standard: ORTHODOXY *syn* see FIDELITY

piezo- *comb form* [Gk *piezein* to press; perh. akin to Skt *piśayati* squeezes]: pressure (*piezometer*)

pie-zo-elec-tric \pe-'zō-(j)ē-'lek-trik, -pē-'āt-(j)ē-/ *adj* [ISV] 1: of, relating to, marked by, or functioning by means of piezoelectricity — **pie-zo-elec-tri-cal-ly** \tri-'k(ə)-lē/ *adv*

pie-zo-elec-tric-i-ty \-lek-'tri-s(ə)-tē-/ *n* [ISV] (1883): electric electric polarity due to pressure *esp*: in a crystalline substance (quartz)

pie-zom-e-ter \pe-'zō-'mā-tər, -pē-'āt-'sā-/ *n* (1820): an instrument measuring pressure or compressibility; *esp*: one for measuring change of pressure of a material subjected to hydrostatic pressure

pie-zo-met-ric \pe-'zō-'me-trik, -pē-'āt-sā-/ *adj*

pie-fle \pi-'fəl/ *vi* **pie-fled**; **pie-fling** \-f(ə)-lɪŋ/ (perh. blend of *pie* and *trifle*) (ca. 1878): to talk or act in a trivial, inept, or ineffective way

trifle *n* (1890): trivial nonsense (pseudo-scientific ~)

pie-fling \pi-'flɪŋ, -f(ə)-lɪŋ/ *adj* (1894): of little worth or importance: TRIVIAL

pig \pig/ *n*, often *attrib* [ME *pigge*] (13c) 1: a young swine not yet fully mature; *broadly*: a wild or domestic swine 2 a: PORK b: a dressed carcass of a young swine weighing less than 130 pounds (logs) c: PIGSKIN 3 a: one that resembles a pig (an un... person is a ~ — S. S. Hall) b: an animal related to or resembling a pig 4: a crude casting of metal (as iron) 5 *slang*: an unwoman 6 *slang*, *usu disparaging*: POLICE OFFICER — **pie-like** *adj*

pig *vb* **pigged**; **pig-ging** *vi* (15c) 1: FARROW 2: to live like a pig (<~ *vi*: FARROW)

pig-boat \pig-'bōt/ *n* (1921): SUBMARINE

pi-geon \pi-'jən/ *n* [ME, fr. MF *pigeon*, fr. LL *pipion*, *pipio* young fr. L *pipire* to chirp] (14c) 1: any of a widely distributed family (Columbidae, order Columbiformes) of birds with a stout body, short legs, and smooth and compact plumage; *esp*: a member of numerous varieties of the rock dove that exist in domestication the feral state in cities and towns throughout most of the world 2: young woman 3: an easy mark: DUPE 4: CLAY PIGEON

pi-geon *n* [alter. of *pidgin*] (1938): an object of special concern: NESS

pi-geon breast *n* (1842): a deformity of the chest marked by sharp projection of the sternum

pi-geon hawk *n* (ca. 1728) 1: a falcon of the No. American population of the merlin 2: SHARP-SHINNED HAWK

pi-geon-hole \pi-'jən-'hōl/ *n* (1577) 1: a hole or small recess for keeping letters or documents 2: a small open compartment (as in a desk or cabinet) for keeping letters or documents 3: a neat category which is used to reflect actual complexities

pi-geonhole *vt* (1840) 1 a: to place in or as if in the pigeonhole desk b: to lay aside: SHELVES (his reports continued to be pigeonholed and his advice not taken — Walter Mills) 2: to assign to a category: CLASSIFY — **pi-geon-holer** \-hō-lər/ *n*

pi-geon-ite \pi-'jə-'nit/ *n* [Pigeon Point, northeast Minn. + *-ite*] 1: a monoclinic mineral of the pyroxene group 2: GENTLE, MILD

pi-geon-liv-ered \pi-'jən-'li-vəd/ *adj* (1602): GENTLE, MILD

pigeon pea *n* (1725): a leguminous woody herb (*Cajanus cajan*) has trifoliate leaves, yellow flowers, and somewhat flat pods much cultivated *esp*: in the tropics; also: its small highly nutritious seed

pi-geon-toed \pi-'jən-'tōd/ *adj* (1801): having the toes turned inward

pi-geon-wing \-wɪŋ/ *n* (ca. 1808): a fancy dance step executed by jumping and striking the legs together

pig-fish \pig-'fɪʃ/ *n* (1860): a saltwater grunt (*Oreochromis chrysotus*) that is a food fish found from Long Island southward

pig-gery \pi-'gə-rē/ *n*, pl **-ger-ies** (1781) 1: a place where pigs are kept 2: swinish behavior

pig-gin \pi-'gɪn/ *n* [ME *pygyn*] (15c): a small wooden pail with a stave extended upward as a handle

pig-gish \pi-'gɪʃ/ *adj* (1792) 1: of, relating to, or suggestive of a pig (<~ snort) 2: having qualities (as greediness or stubbornness) associated with a pig — **pig-gish-ly** *adv* — **pig-gish-ness** *n*

pig-gy \pi-'gē/ *adj* **pig-gier**; **est** (ca. 1845): PIGGISH

pig-gy-back \pi-'gē-'bak/ *adv* [alter. of earlier a *pick pack*, of unknown origin] (1565) 1: up on the back and shoulders 2: on or as if on the back of another; *esp*: on a railroad flatcar

piggyback *n* (ca. 1590) 1: the act of carrying piggyback 2: movement of loaded truck trailers on railroad flatcars

piggyback *adj* (1823) 1: marked by being up on the shoulders of another back (a child needs hugging, tussling, and ~ rides — Benjamin Franklin)

\ɔ\ about \ʌ\ kitten, F table \ɔr\ further \ə\ ash \ā\ ace \ā\ mop, mar
 \aú\ out \ch\ chin \e\ bet \ē\ easy \g\ go \i\ hit \ī\ ice \j\ job
 \ŋ\ sing \ō\ go \ói\ law \ói\ boy \th\ thin \th\ the \ü\ loot \ù\ foot
 \y\ yet \zh\ vision \á, k, n, æ, œ, u, ū, see Guide to Pronunciation

improve to a good or acceptable condition
to bring to a good or acceptable condition

hərd *n* [ME, fr. OE *sceard*; akin to OE *scara*] (bef. 12c) 1 **a**: a piece or fragment
a small piece or part **b**: SHELL, SCALE;
fragments of pottery vessels found on sites
pottery-making peoples have lived 3
fragments of tuffaceous sediments

share, fr. OE *scear*; akin to OHG *scaro*
— more at **SHEAR**] (bef. 12c): PLOWSHARE
cutting, tonsure; akin to OE *scieran* to cut
ing to, due to, or contributed by an indi-
vidual or fair portion 2 **a**: the part allotted
to one owning together property or interest
into which property or invested capital is
equal interests or rights into which the en-
tity is divided and ownership of which is
shared or more certificates **c** *pl*, chiefly Brit

(1590) 1: to divide and distribute in
equal shares **with** **2** **a**: to partake of,
to share in **b**: to have in common
with others **3** **a**: to have a share — used with *in*
of something — **share-er** *n*

share mean to have, get, or use in common
usu. implies that one as the original
owner, use, enjoyment, or possession of a
thing (others). PARTICIPATE implies a having
in, activity, or discussion (*participated*
accepting or acquiring a share esp. of food
refreshments).

share-bæl, 'shar-ə *adj* (1920): capable of
sharing **share-bæl**, 'shar-ə *n*
[back-formation fr. *sharecropper*] *vi*
to farm (land) or pro-

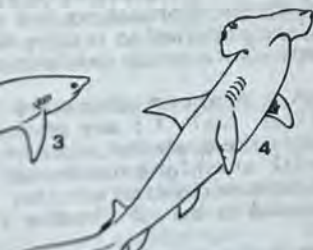
duce (1923): a tenant farmer esp. in the south-
west credit for seed, tools, living quarters,
and who receives an agreed share of the

crop (1828): one that holds or owns a share

of (1933): software with usu. limited capabil-
ity which is available for trial use at little
or no charge upon payment of a fee to the

owner, illustrious] (1599): a descendant of
his daughter Fatima; broadly: one of
preeminence in predominantly Islamic
culture **share-er** *adj*

any of numerous mostly marine carti-
laginous fish that have a fusiform body, lat-
erally compressed, dull gray skin roughened by
small bony scales **shark-lik** *adj*



c: keen in attention: VIGILANT (keep a ~ lookout) **d**: keen in atten-
tion to one's own interest sometimes to the point of being unethical (a
~ trader) 3: keen in spirit or action: as **a**: full of activity or energy
: BRISK (~ blows) **b**: capable of acting or reacting strongly; esp.
: CAUSTIC 4: SEVERE, HARSH: as **a**: inclined to or marked by irritabil-
ity or anger (a ~ temper) **b**: causing intense mental or physical dis-
tress (a ~ pain) **c**: cutting in language or import (a ~ rebuke) 5
: affecting the senses or sense organs intensely: as **a** (1): having a
strong odor or flavor (~ cheese) (2): ACRID **b**: having a strong
piercing sound **c**: having the effect of or involving a sudden brilliant
display of light (a ~ flash) 6 **a**: terminating in a point or edge (~
features) **b**: involving an abrupt or marked change esp. in direction
(a ~ turn) **c**: clear in outline or detail: DISTINCT (a ~ image) **d**
: set forth with clarity and distinctness (~ contrast) 7 **a** of a tone
: raised a half step in pitch **b**: higher than the proper pitch **c**: MA-
JOR, AUGMENTED — used of an interval in music 8: STYLISH, DRESSY —
sharp-ly *adv* — **sharp-ness** *n*

syn SHARP, KEEN, ACUTE mean having or showing alert competence
and clear understanding. SHARP implies quick perception, clever re-
sourcefulness, or sometimes questionable trickiness (*sharp* enough to
spot a confidence game). KEEN suggests quickness, enthusiasm, and a
penetrating mind (a *keen* observer of the political scene). ACUTE im-
plies a power to penetrate and may suggest subtlety and sharpness of
discrimination (an *acute* sense of style).

sharp *adv* (bef. 12c) 1: in a sharp manner 2: EXACTLY (1:15 ~)

sharp *n* (14c): one that is sharp: as **a**: a sharp edge or point **b** (1)
: a musical note or tone one half step higher than a note or tone named
(2): a character # on a line or space of the musical staff indicating a
pitch a half step higher than the degree would indicate without it **c**: a
needle with a small eye for sewing by hand **d**: a real or self-styled
expert; also: SHARPER

sharp *vt* (1662): to raise (as a musical tone) in pitch; esp.: to raise in
pitch by a half step ~ *vi*: to sing or play above the proper pitch

sharp-pei, 'shā-pā, 'shār-ə *n*, *pl* **sharp-peis** [Chin (Guangdong) *sā sand*
+ *péi fur*] (1975): any of an ancient breed of dogs originating in China
that have loose wrinkled skin esp. when young, a short bristly coat,
blue-black tongue, and wide blunt muzzle

sharp-en 'shār-pən *vb* **sharp-ened**; **sharp-en-ing** 'shār-pən-
'shār-pə-*vi* (15c): to make sharp or sharper; esp.: HONE ~ *vi*: to become
sharp or sharper — **sharp-en-er** 'shār-pən-*n*, 'shār-pə-*n*

sharp-er 'shār-pər *n* (1681): CHEAT, SWINDLER; esp.: a cheating gam-
bler

sharp-eyed 'shār-p-īd *adj* (1670): having keen sight; also: keen in
observing or penetrating

sharp-ie or **sharpy** 'shār-pē *n*, *pl* **sharp-ies** (ca. 1859) 1: a long
narrow shallow-draft boat with flat or slightly V-shaped bottom and
one or two masts each carrying a triangular sail 2 **a**: SHARPER **b**
: an exceptionally keen or alert person

sharp-nosed 'shār-p-nōzd *adj* (1561) 1: keen in smelling 2: hav-
ing a pointed nose or snout

sharp practice *n* (1845): the act of dealing in which advantage is
taken or sought unscrupulously

sharp-set 'shār-p-set *adj* (1540): eager in appetite or desire

sharp-shinned hawk 'shār-p-'shind-ə *n* (ca. 1812): a common widely
distributed American accipiter (*Accipiter striatus*) that is grayish above,
has a chestnut breast, short rounded wings, and a tail with a notched
or square tip when folded — called also *sharp-shin*

sharp-shoot-er 'shār-p-shū-tər *n* (1802): a good marksman

sharp-shoot-ing 'shār-p-shū-tīŋ *n* (1806) 1: shooting with great precision
2: accurate and usu. unexpected attack (as in words)

sharp-sight-ed 'shār-sīt-əd *adj* (1571) 1: having acute sight 2: men-
tally keen or alert — **sharp-sight-ed-ly** *adv* — **sharp-sight-ed-ness** *n*

sharp-tongued 'shār-təŋd *adj* (1837): having a sharp tongue: harsh or
bitter in speech or language

sharp-wit-ted 'shār-wīt-əd *adj* (ca. 1586): having an acute mind

shash-lik also **shash-lick** or **shas-lik** 'shāsh-'lik, 'shāsh-'lik *n* [Russ
shashlyk, prob. modif. of Crimean Tatar *šišlik*, fr. *šiš* skewer] (1926)
: KABOB

Shas-ta daisy 'shas-tə-ə *n* [Mount Shasta, California] (ca. 1893): a
large-flowered garden daisy (*Chrysanthemum superbum* syn. *C. maxi-*
mum) that resembles the oxeye daisy

shat *past* and *past part* of SHIT

shat-ter 'sha-tər *vb* [ME *schateren*] *vt* (14c) 1: to cause to drop or
be dispersed 2 **a**: to break at once into pieces **b**: to damage badly
: RUIN 3: to cause the disruption or annihilation of: DEMOLISH ~ *vi*
1: to break apart: DISINTEGRATE 2: to drop off parts (as leaves,
petals, or fruit) — **shat-ter-ing-ly** 'tə-rīŋ-lē *adv*

standardized marks or signs in written matter to clarify the meaning and separate structural units; also : a system of punctuation 3 : something that contrasts or accentuates
punctuation mark *n* (1860) : any of various standardized marks or signs used in punctuation

PUNCTUATION MARKS

| | |
|-----|---|
| . | period (or full stop) |
| , | comma |
| ; | semicolon |
| : | colon |
| ' | apostrophe |
| " | quotation marks, single (or chiefly Brit inverted commas) |
| "" | quotation marks, double (or chiefly Brit inverted commas) |
| > | guillemets |
| ? | question mark (or interrogation point) |
| ¿ | question marks, Spanish |
| ! | exclamation point |
| ¡ | exclamation points, Spanish |
| ? | interrobang |
| / | slash (or diagonal or slant or solidus or virgule) |
| ... | ellipsis (or suspension points) |
| - | hyphen |
| = | double hyphen |
| - | dash (or en dash) |
| - | dash (or em dash) |
| ~ | swung dash |
| () | parentheses (or brackets) |
| [] | brackets, square (or braces) |
| { } | brackets, angle |
| { } | braces (or curly brackets) |

puncture \ˈpʌŋk-tʃər\ *n* [ME, fr. L *punctura*, fr. *punctus*, pp. of *pungere*] (14c) 1 : an act of puncturing 2 : a hole, wound, or perforation made by puncturing 3 : a minute depression

puncture *vb* **punctured**; **puncturing** \ˈpʌŋk-tʃə-rɪŋ, ˈpʌŋk-shrɪŋ\ *vt* (1699) 1 : to pierce with or as if with a pointed instrument or object 2 : to make useless or ineffective as if by a puncture : **DEFLATE** ~ *vi* : to become punctured

puncture vine *n* (1911) : an Old World annual prostrate herb (*Tribulus terrestris*) of the caltrop family that has hard spiny pods and is a troublesome weed esp. in the western U.S. — called also *caltrop*, *punctureweed*

pundit \ˈpʌn-dɪt\ *n* [Hindi *paṇḍit*, fr. Skt *paṇḍita*, fr. *paṇḍita* learned] (1672) 1 : PANDIT 2 : a learned man : TEACHER 3 : one who gives opinions in an authoritative manner : CRITIC — **punditry** \-dɪ-trɪ\ *n*

pung \ˈpʌŋ\ *n* [short for earlier *tow-pong*, of Algonquian origin; akin to Micmac *tobāgun* drag made with skin] (1825) *NewEng* : a sleigh with a box-shaped body

pungency \ˈpʌŋ-jən(t)-sē\ *n* (1649) : the quality or state of being pungent

pungent \-jənt\ *adj* [L *pungent-*, *pungens*, prp. of *pungere* to prick, sting; akin to L *pugnus* fist, *pugnare* to fight, Gk *pygnē* fist] (1597) 1 : sharply painful 2 : having a stiff and sharp point (~ leaves) 3 a : marked by a sharp incisive quality : CAUSTIC (a ~ critic) (~ language) b : being sharp and to the point 4 : causing a sharp or irritating sensation; esp : ACID — **pungently** *adv*

pungent, **PIQUANT**, **POIGNANT**, **RACY** mean sharp and stimulating to the mind or the senses. **PUNGENT** implies a sharp, stinging, or biting quality esp. of odors (a cheese with a pungent odor). **PIQUANT** suggests a power to whet the appetite or interest through tartness or mild pungency (a piquant sauce). **POIGNANT** suggests something is sharply or piercingly effective in stirring one's consciousness or emotions (felt a poignant sense of loss). **RACY** implies having a strongly characteristic natural quality fresh and unimpaired (spontaneous, racy prose).

pungle \ˈpʌŋ-gəl\ *vb* **pungled**; **pungling** \ˈpʌŋ-g(ə)-lɪŋ\ [Sp *póngale* put it down] *vt* (1851) : to make a payment or contribution of (money) — usu. used with *up* ~ *vi* : PAY, CONTRIBUTE — usu. used with *up*

Punic \ˈpyū-nɪk\ *adj* [L *punicus*, fr. *Poenus* inhabitant of Carthage; akin to Gk *Phoinix* Phoenician] (1533) 1 : of or relating to Carthage or the Carthaginians 2 : FAITHLESS, TREACHEROUS

Punic *n* (1673) : the Phoenician dialect of ancient Carthage

punish \ˈpʌ-nɪʃ\ *vb* [ME *punissen*, fr. MF *puniss-*, stem of *punir*, fr. L *punire*, fr. *poena* penalty — more at PAIN] *vt* (14c) 1 a : to impose a penalty on for a fault, offense, or violation b : to inflict a penalty for the commission of (an offense) in retribution or retaliation 2 a : to deal with roughly or harshly b : to inflict injury on : HURT ~ *vi* : to inflict punishment — **punish-ability** \-ə-bɪ-lə-tē\ *n* — **punishable** \ˈpʌ-nɪʃ-ə-bəl\ *adj* — **punish-er** *n*

punish, **CHASTISE**, **CASTIGATE**, **CHASTEN**, **DISCIPLINE**, **CORRECT** mean to inflict a penalty on in requital for wrongdoing. **PUNISH** implies subjecting to a penalty for wrongdoing (punished for stealing). **CHASTISE** may apply to either the infliction of corporal punishment or to verbal censure or denunciation (chastised his son for neglecting his studies). **CASTIGATE** usu. implies a severe, typically public censure (an editorial castigating the entire city council). **CHASTEN** suggests any affliction or trial that leaves one humbled or subdued (chastened by a landslide election defeat). **DISCIPLINE** implies a punishing or chastening in order to bring under control (parents must discipline their children). **CORRECT** implies punishing aimed at reforming an offender (the function of prison is to correct the wrongdoer).

punishment \ˈpʌ-nɪʃ-mənt\ *n* (15c) 1 : the act of punishing 2 a : suffering, pain, or loss that serves as retribution b : a penalty inflicted on an offender through judicial procedure 3 : severe, rough, or disastrous treatment

pu-ni-tion \ˈpyū-ˈni-shən\ *n* [ME *punicion*, fr. MF *punition*, fr. L *punitio*, fr. *punitio*, fr. *punire*] (15c) : PUNISHMENT

pu-ni-tive \ˈpyū-nə-tɪv\ *adj* [F *punitif*, fr. ML *punitivus*, fr. L *punitus*, pp. of *punire*] (1624) : inflicting, involving, or aiming at punishment — **pu-ni-tive-ly** *adv* — **pu-ni-tive-ness** *n*

punitive damages *n pl* (ca. 1890) : damages awarded in excess of normal compensation to the plaintiff to punish a defendant for a serious wrong

Punjabi \ˈpʌŋ-jä-bē, -ˈjə-\ *n* [Hindi *pañjābī*, fr. *pañjābī* of Punjab, fr. Per *pañjābī*, fr. *Panjāb* Punjab] (1846) 1 : PANJABI 2 : a native or inhabitant of the Punjab region of the northwestern Indian subcontinent — **Punjabi** *adj*

punk \ˈpʌŋk\ *n* [origin unknown] (1596) 1 *archaic* : PROSTITUTE 2 [prob. partly fr. 'punk] : NONSENSE, FOOLISHNESS 3 a : a young inexperienced person : BEGINNER, NOVICE; esp : a young man b : a usu. petty gangster, hoodlum, or ruffian c : a youth used as a homosexual partner 4 a : PUNK ROCK b : a punk rock musician c : one who affects punk styles

punk *adj* (1896) 1 : very poor : INFERIOR (played a ~ game) 2 : being in poor health (said that she was feeling ~) 3 a : of or relating to punk rock b : relating to or being a style (as of dress or hair) inspired by punk rock — **punk-ish** \ˈpʌŋ-kɪʃ\ *adj*

punk *n* [perh. alter. of *spunk*] (1687) 1 : wood so decayed as to be dry, crumbly, and useful for tinder 2 : a dry spongy substance prepared from fungi (genus *Fomes*) and used to ignite fuses esp. of fireworks

punk-kah \ˈpʌŋ-kə\ *n* [Hindi *pākhā*] (1787) : a fan used esp. in India that consists of a canvas-covered frame suspended from the ceiling and that is operated by a cord

punk-er \ˈpʌŋ-kər\ *n* (1977) : 'PUNK 4b, c
punk-kie also **punk-ky** \ˈpʌŋ-kē\ *n, pl* **punkies** [New York D *punki*, modif. of Delaware (Munsee) *pōnkwas*] (1769) : BITING MIDGE

punk-kin \ˈpʌŋ-kən\ *var* of PUMPKIN

punk rock *n* (1971) : rock music marked by extreme and often deliberately offensive expressions of alienation and social discontent — **punk rocker** *n*

punky \ˈpʌŋ-kē\ *adj* **punk-i-er**; **-est** \ˈpʌŋk\ (1872) : resembling punk in being soft or rotted — **punk-i-ness** *n*

punky *adj* \ˈpʌŋk\ (1972) : resembling or typical of a punk

pun-net \ˈpʌ-nət\ *n* [origin unknown] (ca. 1822) *Brit* : a small basket for fruits or vegetables

Punnett square \ˈpʌ-nət-\ *n* [Reginald C. Punnett †1967 Eng. geneticist] (1942) : an *n* × *n* square used in genetics to calculate the frequencies of the different genotypes and phenotypes among the offspring of a cross

pun-ny \ˈpʌ-nē\ *adj* **pun-ni-er**; **-est** (1947) : constituting or involving a pun

pun-ster \ˈpʌn(t)-stər\ *n* (1700) : one who is given to punning

punt \ˈpʌnt\ *n* [(assumed) ME, fr. OE, fr. L *ponton-*, *ponto*] (bef. 12c) : a long narrow flat-bottomed boat with square ends usu. propelled with a pole

punt *vt* (1816) : to propel (as a punt) with a pole

punt *vi* [Fr *ponter*, fr. *ponte* point in some games, play against the banker, fr. Sp *punto* point, fr. L *punctum* — more at POINT] (1712) 1 : to play at a gambling game against the banker 2 *Brit* : GAMBLE

punt *vb* [origin unknown] *vt* (1845) : to kick (a football or soccer ball) with the top of the foot before the ball which is dropped from the hands hits the ground ~ *vi* : to punt a ball

punt *n* (1845) : the act or an instance of punting a ball

punt \ˈpʌnt\ *n* [Ir, pound, fr. E *pound*] (1975) : the monetary pound of Ireland

punter \ˈpʌn-tər\ *n* (ca. 1706) : one that punts; as a chiefly *Brit* : a person who gambles; esp : one who bets against a bookmaker b : one who uses a punt in boating c : one who punts a ball

punt formation *n* (1949) : an offensive football formation in which a back makes a punt stands approximately 10 yards behind the line and the other backs are in blocking position close to the line

pun-ty \ˈpʌn-tē\ *n, pl* **punties** [F *pontil*] (1662) : a metal rod used for fashioning hot glass

pu-ny \ˈpyū-nē\ *adj* **pu-ni-er**; **-est** [MF *puisné* younger, lit., born afterward, fr. *puis* afterward + *né* born] (1593) : slight or inferior in power, size, or importance : WEAK — **pu-ni-ly** \ˈpyū-nɪ-ē\ *adv* — **pu-ni-ness** \ˈpyū-nē-nəs\ *n*

pup \ˈpʌp\ *n* [short for *puppy*] (1773) : a young dog; also : one of the young of various animals (as a seal or rat)

pup *vi* **pupped**; **pup-ping** (1787) : to give birth to pups

pu-pa \ˈpyū-pə\ *n, pl* **pu-pae** \-(j)pē also -pī\ or **pupas** [NL, fr. L *pupa* doll] (1815) : an intermediate usu. quiescent stage of a metamorphic insect (as a bee, moth, or beetle) that occurs between the larva and the imago, is usu. enclosed in a cocoon or protective covering, and undergoes internal changes by which larval structures are replaced by those typical of the imago — **pu-pal** \ˈpyū-pəl\ *adj*

pu-par-i-um \ˈpyū-par-ē-əm, -ˈper-\ *n, pl* **pu-par-ia** \-ē-ə\ [NL, fr. *pupa*] (1815) : a rigid outer shell formed from the larval skin that covers some pupae (as of a dipteran fly)

pu-pate \ˈpyū-pāt\ *vi* **pu-pat-ed**; **pu-pat-ing** (ca. 1879) : to become a pupa : pass through a pupal stage — **pu-pation** \ˈpyū-pā-shən\ *n*

pup-fish \ˈpʌp-fɪʃ\ *n* (1949) : any of several killifishes (genus *Cyprinodon* of the family Cyprinodontidae) esp. of warm streams and springs of the western U.S.

pu-pil \ˈpyū-pəl\ *n* [ME *pupille* minor ward, fr. MF, fr. L *pupillus* male ward (fr. dim. of *pupus* boy) & *pupilla* female ward, fr. dim. of *pupa* girl, doll] (1536) 1 : a child or young person in school or in the charge of a tutor or instructor : STUDENT 2 : one who has been taught or influenced by a famous or distinguished person

pupil *n* [MF *pupille*, fr. L *pupilla*, fr. dim. of *pupa* doll; fr. the tiny image of oneself seen reflected in another's eye] (1567) : the contractile aperture in the iris of the eye — **pu-pil-lary** \ˈpyū-pə-ˈler-ē\ *adj*

\ə\ about \ə\ kitten, F table \ər\ further \ə\ ash \ā\ ace \ā\ mop, mar
 \a\ out \ch\ chin \e\ bet \ē\ easy \g\ go \i\ hit \ī\ ice \j\ job
 \ŋ\ sing \ō\ go \ō\ law \ō\ boy \th\ thin \th\ the \ū\ loot \ū\ foot
 \y\ yet \zh\ vision \ā, k, n, æ, œ, ue, ū, see Guide to Pronunciation

for financial gain (a piece of the ~) 9: the most vigorous, productive, or exciting activity in a particular field, area, or group (they itch to go where the ~ is — D. J. Henahan)

action-able \ˈak-sh(ə)-nə-bəl/ *adj* (1591): subject to or affording ground for an action or suit at law — **action-ably** \-blē/ *adv*

action-er \ˈak-sh(ə)-nər/ *n* (1973): a film dominated by a high degree of exciting action

action figure *n* (1987): a small-scale figure usu. of a superhero used esp. as a toy

action-less \ˈak-shən-ləs/ *adj* (ca. 1817): marked by inaction: IMMOBILE

action painting *n* (1952): abstract expressionism marked esp. by the use of spontaneous techniques (as dribbling, splattering, or smearing) — **action painter** *n*

action potential *n* (1926): a momentary reversal in electrical potential across a plasma membrane (as of a nerve cell or muscle fiber) that occurs when a cell has been activated by a stimulus

ac-ti-vate \ˈak-tə-vāt/ *vb* -**vat-ed**; -**vat-ing** *vt* (1626): to make active or more active: as **a** (1): to make (as molecules) reactive or more reactive (2): to convert (as a vitamin) into a biologically active derivative **b**: to make (a substance) radioactive **c**: to treat (as carbon or alumina) so as to improve adsorptive properties **d** (1): to set up or formally institute (as a military unit) with the necessary personnel and equipment (2): to put (an individual or unit) on active duty ~ *vi*: to become active — **ac-ti-va-tion** \ˈak-tə-vā-shən/ *n* — **ac-ti-va-tor** \ˈak-tə-vā-tər/ *n*

activated carbon *n* (1921): a highly adsorbent powdered or granular carbon made usu. by carbonization and chemical activation and used chiefly for purifying by adsorption — called also *activated charcoal*

activation analysis *n* (1949): NEUTRON ACTIVATION ANALYSIS

activation energy *n* (1940): the minimum amount of energy required to convert a normal stable molecule into a reactive molecule

ac-tive \ˈak-tiv/ *adj* [ME, fr. MF or L; MF *actif*, fr. L *activus*, fr. *actus*, pp. of *agere* to drive, do — more at AGENT] (14c) **1**: characterized by action rather than by contemplation or speculation **2**: producing or involving action or movement **3 a** of a verb form or voice: asserting that the person or thing represented by the grammatical subject performs the action represented by the verb (*hits* in "he hits the ball" is ~) **b**: expressing action as distinct from mere existence or state **4**: quick in physical movement: LIVELY **5**: marked by vigorous activity: BUSY (the stock market was ~) **6**: requiring vigorous action or exertion (~ sports) **7**: having practical operation or results: EFFECTIVE (an ~ law) **8 a**: disposed to action: ENERGETIC (took an ~ interest) **b**: engaged in an action or activity (an ~ club member) **c** of a volcano: currently erupting or likely to erupt — compare DORMANT **2a**, EXTINCT **1b** **d**: characterized by emission of large amounts of electromagnetic energy (an ~ galactic nucleus) **9**: engaged in full-time service esp. in the armed forces (~ duty) **10**: marked by present operation, transaction, movement, or use (~ account) **11 a**: capable of acting or reacting: reacting readily (~ nitrogen) **b**: tending to progress or to cause degeneration (~ tuberculosis) **c** of an electronic circuit element: capable of controlling voltages or currents **d** (1): requiring the expenditure of energy (~ calcium ion uptake) (2): functioning by the emission of radiant energy (radar is an ~ sensor) **12**: still eligible to win the pot in poker **13**: moving down the line: visiting in the set — used of couples in contredanses or square dances — **active** *n* — **ac-tive-ly** *adv* — **ac-tive-ness** *n*

active immunity *n* (ca. 1903): usu. long-lasting immunity that is acquired through production of antibodies within the organism in response to the presence of antigens — compare PASSIVE IMMUNITY

active transport *n* (1963): the movement of a chemical substance by the expenditure of energy against a gradient in concentration or in electrical potential across a plasma membrane

ac-tiv-ism \ˈak-ti-vi-zəm/ *n* (1915): a doctrine or practice that emphasizes direct vigorous action esp. in support of or opposition to one side of a controversial issue — **ac-tiv-ist** \-vist/ *n* or *adj* — **ac-tiv-is-tic** \ˈak-ti-vi-s-tik/ *adj*

ac-tiv-i-ty \ˈak-ti-və-tē/ *n*, *pl* -**ties** (1530) **1**: the quality or state of being active **2**: vigorous or energetic action: LIVELINESS **3**: natural or normal function: as **a**: a process (as digestion) that an organism carries on or participates in by virtue of being alive **b**: a similar process actually or potentially involving mental function; *specif*: an educational procedure designed to stimulate learning by firsthand experience **4**: an active force **5 a**: a pursuit in which a person is active **b**: a form of organized, supervised, often extracurricular recreation **6**: an organizational unit for performing a specific function; *also*: its function or duties

act of God (ca. 1859): an extraordinary interruption by a natural cause (as a flood or earthquake) of the usual course of events that experience, prescience, or care cannot reasonably foresee or prevent

ac-to-my-o-sin \ˈak-tə-mi-ə-sən/ *n* [ISV *actin* + *-o-* + *myosin*] (1942): a viscous contractile complex of actin and myosin concerned together with ATP in muscular contraction

ac-tor \ˈak-tər/ *also* -**tōr** *n* (15c) **1**: one that acts: DOER **2 a**: one who represents a character in a dramatic production **b**: a theatrical performer **c**: one that behaves as if acting a part **3**: one that takes part in any affair — **ac-tor-ish** \-tə-rish/ *adj*

act out *vt* (1611) **1 a**: to represent in action (children *act out* what they read) **b**: to translate into action (unwilling to *act out* their beliefs) **2**: to express (as an impulse or a fantasy) directly in overt behavior without modification to comply with social norms

ac-tress \ˈak-trəs/ *n* (1676): a woman who is an actor — **ac-tress-ly** \-trə-sē/ *adj*

Acts \ˈakts/ *n* *pl* but *sing* in *constr*: a book in the New Testament narrating the beginnings of the Christian Church — called also *Acts of the Apostles*; see BIBLE table

ac-tu-al \ˈak-ch(ə)-wəl, -sh(ə)-wəl/ *adj* [ME *actuel*, fr. MF, fr. LL *actualis*, fr. L *actus* act] (14c) **1 obs**: ACTIVE **2 a**: existing in act and not merely potentially **b**: existing in fact or reality (~ and imagined conditions) **c**: not false or apparent (~ costs) **3**: existing or occurring at the time: CURRENT (caught in the ~ commission of a crime)

actual cash value *n* (ca. 1946): money equal to the cost of replacing lost, stolen, or damaged property after depreciation

ac-tu-al-i-ty \ˈak-chə-ˈwə-lə-tē, -sh(ə)-wə-lə-tē/ *n*, *pl* -**ties** (1652) **1**: the quality or state of being actual **2**: something that is actual: FACT, REALITY (possible risks which have been seized upon as *actualities* — T. S. Eliot)

ac-tu-al-ize \ˈak-ch(ə)-wə-līz, -sh(ə)-wə-līz/ *vb* -**ized**; -**izing** *vt* (1701): to make actual: REALIZE ~ *vi*: to become actual — **ac-tu-al-iza-tion** \ˈak-ch(ə)-wə-lə-ˈzā-shən, -sh(ə)-wə-lə-ˈzā-shən/ *n*

ac-tu-al-ly *adv* \ˈak-ch(ə)-wə-lē, -sh(ə)-wə-lē/ *adv* (15c) **1**: in act or in fact: REALLY (nominally but not ~ independent — Karl Loewenstein) (won't ~ arrive for an hour) **2**: in point of fact — used to suggest something unexpected (he could ~ read the Greek)

ac-tu-ar-i-al \ˈak-chə-ˈwer-ē-əl, -shə-ˈwə-lē/ *adj* (1869) **1**: of or relating to actuaries **2**: relating to statistical calculation esp. of life expectancy — **ac-tu-ar-i-al-ly** \-ē-ə-lē/ *adv*

ac-tu-ary \ˈak-chə-ˈwer-ē, -shə-ˈwə-lē/ *n*, *pl* -**aries** [L *actuarius* shorthand writer, alter. of *actarius*, fr. *actum* record — more at ACT] (1553) **1 obs**: CLERK, REGISTRAR **2**: one who calculates insurance and annuity premiums, reserves, and dividends

ac-tu-ate \ˈak-chə-wāt, -shə-ˈwə-lē/ *vt* -**at-ed**; -**at-ing** [ML *actuatus*, pp. of *actuare* to execute, fr. L *actus* act] (1645) **1**: to put into mechanical action or motion **2**: to move to action *syn* see MOVE — **ac-tu-a-tion** \ˈak-chə-ˈwā-shən, -shə-ˈwə-lē/ *n*

ac-tu-a-tor \ˈak-chə-wā-tər, -shə-ˈwə-lē/ *n* (ca. 1864): one that actuates; *specif*: a mechanical device for moving or controlling something

act up *vi* (1903) **1**: to act in a way different from that which is normal or expected: as **a**: to behave in an unruly, recalcitrant, or capricious manner **b**: SHOW OFF **c**: to function improperly (this typewriter is *acting up* again) **2**: to become active or acute after being quiescent (her rheumatism started to *act up*)

ac-uity \ˈak-kyū-ə-tē, -a-ˈnē/ *n*, *pl* -**ities** [MF *acuité*, fr. LL *acuitat*, *acuitas*, fr. L *acuere*] (1543): keenness of perception: SHARPNESS

acu-le-ate \ˈak-kyū-lē-ət/ *adj* [L *aculeatus* having stings, fr. *aculeus* sting, fr. *acus*] (1875): relating to or being hymenopterans (as bees, ants, and many wasps) of a division (Aculeata) typically having the ovipositor modified into a sting

acu-men \ˈak-kyū-mən, -a-ˈkya-mən/ *n* [L *acumin*, *acumen*, lit., point, fr. *acuere*] (ca. 1580): keenness and depth of perception, discernment, or discrimination esp. in practical matters *syn* see DISCERNMENT

acu-mi-nate \ˈak-kyū-mə-nət/ *adj* (1646): tapering to a slender point

acu-pres-sure \ˈak-kyū-pre-shər, -a-ˈka-/ *n* (1958): the application of pressure (as with the thumbs or fingertips) to the same discrete points on the body stimulated in acupuncture that is used for its therapeutic effects (as the relief of tension or pain) — compare SHIATSU

acu-punc-ture \ˌpʌŋ(k)-chər/ *n* [L *acus* + E *puncture*] (1684): an orig. Chinese practice of puncturing the body (as with needles) at specific points to cure disease or relieve pain (as in surgery) — **acu-punc-tur-ist** \ˌpʌŋ(k)-chə-rɪst/ *n*

acute \ˈak-yūt/ *adj* **acut-er**; **acut-est** [L *acutus*, pp. of *acuere* to sharpen, fr. *acus* needle; akin to L *acer* sharp — more at EDGE] (14c) **1 a** (1): characterized by sharpness or severity (~ pain) (2): having a sudden onset, sharp rise, and short course (~ disease) **b**: lasting a short time (~ experiments) **2**: ending in a sharp point: as **a**: being or forming an angle measuring less than 90 degrees (~ angle) **b**: composed of acute angles (~ triangle) **3 a** of an accent mark: having the form **b**: marked with an acute accent **c**: of the variety indicated by an acute accent **4 a**: marked by keen discernment or intellectual perception esp. of subtle distinctions: PENETRATING (an ~ thinker) **b**: responsive to slight impressions or stimuli (~ hearing) **5**: felt, perceived, or experienced intensely (~ distress) **6**: seriously demanding urgent attention — **acute-ly** *adv* — **acute-ness** *n*

syn ACUTE, CRITICAL, CRUCIAL mean of uncertain outcome. ACUTE stresses intensification of conditions leading to a culmination or breaking point (an *acute* housing shortage). CRITICAL adds to ACUTE implications of imminent change, of attendant suspense, and of decisiveness in the outcome (the war has entered a *critical* phase). CRUCIAL suggests a dividing of the ways and often a test or trial involving the determination of a future course or direction (a *crucial* vote). *syn* see in addition SHARP

acy-clic \ˈaj-si-klɪk, -ˈsi-/ *adj* (1878): not cyclic: as **a**: not disposed in whorls or cycles **b**: having an open-chain structure: ALIPHATIC (an ~ compound)

acy-clo-vir \ˈaj-si-klō-vīr/ *n* [*2a* + *cycl-* + *virus*] (1979): a cyclic nucleoside $C_8H_{11}N_5O_3$ used esp. to treat the symptoms of the genital form of herpes simplex

ac-yl \ˈa-səl/ *n*, *often attrib* [ISV, fr. *acid*] (1899): a radical RCO— derived usu. from an organic acid by removal of the hydroxyl from all acid groups — often used in combination

ac-yl-ate \ˈa-sə-lāt/ *vt* -**at-ed**; -**at-ing** (1907): to introduce an acyl group into — **ac-yl-a-tion** \ˈa-sə-lā-shən/ *n*

ad \ˈad/ *n*, *often attrib* (1841) **1**: ADVERTISEMENT **2**: ADVERTISING **ad** *n* (1947): ADVANTAGE **4**

ad- or **ac-** or **af-** or **ag-** or **al-** or **ap-** or **as-** or **at-** *prefix* [ME, fr. MF, OF & L; MF, fr. OF, fr. L, fr. ad — more at AT] **1**: to: toward — usu. before *g*, *k*, or *q* (acculturation) and *af-* before *f* (affluent) and *ag-* before *g* (aggradation) and *al-* before *l* (alliteration) and *ap-* before *p* (apportion) and *as-* before *s* (assuasive) and *at-* before *t* (attune) and *ad-* before other sounds but sometimes *ad-* even before one of the listed consonants (adsorb) **2**: near: adjacent to — in this sense always in the form *ad-* (adrenal)

ad \ˈad/ *adv*, *ad* *adv* suffix [L *ad*]: in the direction of: toward (cephalad)

ad *n* suffix [prob. fr. NL *ad-*, *-as*, fr. Gk, suffix denoting descent from or connection with]: member of a botanical group (bromeliad)

Ada \ˈā-də/ *trademark* — used for a structured computer programming language

ad-age \ˈā-dij/ *n* [MF, fr. L *adagium*, fr. *ad-* + *-agium* (akin to *aio* I say); akin to Gk *ē* he said] (1548): a saying often in metaphorical form that embodies a common observation

ada-gio \ˈā-djə(-)ō, -zh(-)jō/ *adv* or *adj* [It, fr. *ad* to + *agio* ease] (1724): at a slow tempo — used chiefly as a direction in music

adagio *n*, *pl* -**gios** (1754) **1**: a musical composition or movement in adagio tempo **2**: a ballet duet by a man and woman or a mixed trio displaying difficult feats of balance, lifting, or spinning

Ad-am \ˈā-dəm/ *n* [ME, fr. LL, fr. Gk, fr. Heb *Ādām*] **1**: the first man and father by Eve of Cain and Abel **2**: the unregenerate nature

EN LIBS



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LONGMAN DICTIONARY OF THE ENGLISH LANGUAGE

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cuspid

grinding surface of a tooth 2 a fleshy fold or flap of a heart valve 3 the initial point of an astrological house [L *cuspid* point] - *cuspidate* also *cuspidated* *adj*

cuspid /'kʊspɪd/ *n* a pointed tooth; CANINE 1 [back-formation fr *bicuspid*]

cuspidate /'kʊspɪdaɪt/, *cuspidated* /-aɪtɪd/ *adj* 1 having a cusp or cusps 2 esp of a leaf ending in a point [L *cuspidatus*, pp of *cuspidare* to make pointed, fr *cuspid*, *cuspidis* point]

cuspidor /'kʊspɪdaʊ/ *n* SPITTOON (bowl for spitting in) [Pg *cuspidouro* place for spitting, fr *cuspir* to spit, fr L *conspuere*, fr *com-* + *spuere* to spit - more at SPEW]

cuss /kʊs/ *n*, informal 1 a curse 2 a fellow <a harmless old ~> [(1) by alter.; (2) partly alter. of *curse*, partly short for *customer*]

cuss *vb*, informal to curse - *cusser* *n*

cussed /'kʊsɪd, kʊst/ *adj*, informal 1 cursed 2 obstinate, cantankerous - *cussedly* *adv*, *cussedness* *n*

cussword /'kʊs,wʊd/ *n*, chiefly NAM a swearword

custard /'kʊstəd/ *n* 1 a thick, usu sweetened, and often baked mixture made with milk and eggs 2 a sweet sauce made with milk and eggs or a commercial preparation of coloured cornflour [ME *custarde*, *crustade*, a kind of pie, prob deriv of OF *croûte* crust]

custard apple *n* 1 (the soft-fleshed edible fruit of) any of a genus (*Annona*) of the family Annonaceae, the custard-apple family) of chiefly tropical American trees and shrubs: e.g. 1a (the light green to yellow acid fruit of) a small W Indian tree (*Annona reticulata*) - called also BULLOCK'S HEART 1b a sour-sop 1c a sweetsop 2 PAPAWE 2 [fr the custard-like appearance & flavour of its pulp]

custard pie *n* a soft pie that is thrown at someone or applied forcefully to someone's face in slapstick comedy

Custer /'kʊstə/, George Armstrong 1839-1876 US general; was massacred with an entire detachment of men by Sioux Indians at the battle of Little Bighorn

custodial /ku'stəʊdiəl/ *adj* 1 of guardianship or custody; *specific* marked by or given to watching and protecting rather than seeking to cure <~ care> 2 of or involving imprisonment or legal detention <a ~ sentence>

custodian /ku'stəʊdiən/ *n* one who or that which guards and protects or maintains <a self-appointed ~ of public morals>; esp the curator of a library, castle, museum, etc - *custodianship* *n*

custody /'kʊstədi/ *n* 1a the state of being cared for or guarded 1b imprisonment, detention 2 the act or right of caring for somebody, esp when granted by a court of law; guardianship <the father gained ~ of the children after the divorce> [ME *custodie*, fr L *custodia* guarding, fr *custod-*, *custos* guardian]

custom /'kʊstəm/ *n* 1a (an) established socially accepted practice 1b long-established practice having the force of law 1c the usual practice of an individual 1d the practices or conventions that regulate social life 2 pl 2a duties, tolls, etc imposed by a country on imports or exports 2b taking sing or pl *vb* the agency, establishment, or procedure for collecting such customs 3 regular support given to a shop or business by people who buy their goods or services *synonyms* see HABIT, TAX [ME *custume*, fr OF, fr L *consuetudin-*, *consuetudo*, fr *consuetus*, pp of *consuescere* to accustom, fr *com-* + *suescere* to accustom, akin to *suius* one's own - more at SUICIDE]

custom *adj*, chiefly NAM 1 made or performed according to personal order <~ clothes> 2 specializing in custom work or operation <a ~ tailor>

customary /'kʊstəmə(r)/ *adj* 1 based on or established by custom; usual 2 commonly practised, used, or observed *synonyms* see USUAL *antonym* occasional - *customariness* *n*, *customarily* *adv*

custom-built *adj* built to individual specifications <a ~ car>

customer /'kʊstəmə/ *n* 1 a person who (regularly) buys goods or services from a shop or trader 2 informal an individual, usu having some specified distinctive trait <a tough ~> [ME *customer*, fr *custume*]

customhouse /'kʊstəm,haʊs/ *n*, NAM CUSTOMS HOUSE

custom-ize, -ise /'kʊstəmaɪz/ *vt*, chiefly NAM to build, fit, or alter according to individual specifications - *customizer* *n*

custom-made *adj* made to individual specifications <a ~ suit>

customs house *n* a building where customs and duties are paid or collected

customs union *n* an agreement between two or more states to allow free trade between themselves but to impose a common external tariff on imports from nonmember states

cut /kʊt/ *vb* -tt-, *cut* *vt* 1a to penetrate (as if) with an edged instrument; make an incision in 1b to castrate (a usu male animal) 1c to hurt the feelings of 1d to strike sharply with a cutting effect; slice or enter into with an effect like a sharp instrument <this wind ~s me to the bone> 1e to strike (a ball)

with a glancing blow that imparts a reverse spin; ¹CHOP 2a 1f to play a cut shot in cricket at (a ball) or at the bowling of (a bowler) 1g to hit and propel (a ball in billiards, snooker, etc) at a marked angle by a fine contact with the ball struck by the cue 1h to experience the emergence of (a tooth) through the gum 2a to trim, pare <~ one's nails> 2b to shorten by omissions <~ the script of the play>; also EDIT 1b (put into final form by rearranging) 2c to dilute, adulterate <~ the whisky with water> 2d to reduce in amount <~ costs> 3a to mow, reap <~ hay> 3b(1) to divide into parts with an edged instrument <~ bread>; also to sever a part from <just going to ~ some flowers, dear> 3b(2) to fell, hew <~ timber> 3c to go across rather than round; go very near to 4a to divide into segments or shares 4b to intersect, cross <this line ~s that one here> 4c to break, interrupt <~ our supply lines> 4d(1) to divide (a pack of cards) into two portions 4d(2) to draw (a card) from the pack 5a to stop, cease <~ the nonsense> 5b to refuse to recognize (an acquaintance) 5c to stop (a motor) by opening a switch; turn off 5d to end the filming of (a scene in a film, television show, etc) 6a to make or give shape to (as if) with an edged tool <~ a diamond> <~ stone> 6b to shear or hollow out 6c to record sounds on (a gramophone record) 7a to engage in (e.g. a mischievous action); perform, make <~ a caper> <~ a dash> 7b to give the appearance or impression of <~ a fine figure> 8 informal to absent oneself from (e.g. a class or function) ~ *vi* 1a to function (as if) as an edged tool 1b to be able to be separated, divided, or marked with a sharp implement <cheese ~s easily> 1c to perform the operation of dividing, severing, incising, or intersecting 1d to make a stroke with a whip, sword, etc 1e to play a cut shot in cricket 1f to wound feelings or sensibilities 1g to cause constriction or chafing 1h to be of effect, influence, or significance <an analysis that ~s deep> 2a(1) to divide a pack of cards, esp in order to decide who will deal or to settle a bet 2a(2) to draw a card from the pack 2b to divide spoils 3a to proceed obliquely from a straight course <~ across the yard> 3b to move swiftly <a yacht ~ting through the water> 3c to follow an oblique or diagonal line 3d to change sharply in direction; swerve 3e to make an abrupt transition from one sound or image to another in film, radio, or television 3f to stop filming or recording - see also CUT CORNERS, cut it FINE, cut no ICE, cut off one's NOSE to spite one's face, cut SHORT, cut down to SIZE [ME *cutten*]

cut across *vt* 1 to take a shorter or easier way across (a field, corner, etc) 2 to go beyond or across the limits of <a new political group that cuts across old party loyalties> 3 to be opposed to <the decision cut across previous actions>

cut along *vi*, informal to go away; leave

cut back *vt* 1 to shorten by cutting; prune <cut back the shrubs> 2 to reduce, decrease <cut back expenditure> ~ *vi* 1 to interrupt the sequence of a plot (e.g. of a film) by returning to events occurring previously 2 to reduce something in size or amount; economize - see also CUTBACK

cut down *vt* 1 to bring down by cutting; fell <cut down the trees> 2 to strike down and kill or incapacitate <cut down in battle> <the disease cut him down in his prime> 3 to reduce or make smaller <cut the elder daughter's dress down to fit the younger> 4 to reduce, curtail <cut down expenses> ~ *vi* to reduce or curtail volume or activity <cut down on smoking>

cut in *vi* 1 to thrust oneself into a position between others or belonging to another; esp to drive into a gap in a line of traffic so as to nearly cause an accident 2 to join in something suddenly <cut in on the conversation> 3 to interrupt a dancing couple and take one of them as one's own partner 4 to become automatically connected or started in operation <the fridge suddenly cut in as the temperature rose> ~ *vt* 1 to introduce into a number, group, or sequence 2 to include, esp among those benefiting or favoured <cut them in on the profits>

cut off *vt* 1 to strike off; sever 2 to bring to an untimely end <cut off in their prime> 3 to stop the passage of <cut off supplies> 4 to shut off, bar <the fence cuts off my view> 5 to separate, isolate <cut himself off from his family> 6 to disinherit <cut her off without a penny> 7a to stop the operation of; turn off 7b to stop or interrupt while in communication <the operator cut me off> - see also CUTOFF

cut out *vt* 1 to form or shape (as if) by cutting, erosion, etc <cut out a sewing pattern> <cut out a niche in politics> 2 to take the place of; supplant 3 to put an end to; desist from <cut out smoking> 4a to remove or exclude (as if) by cutting; esp to intercept (a pass, shot, etc) in football 4b to make inoperative ~ *vi* 1 to drive suddenly to the other side of the road or into an adjacent lane, esp to overtake 2 to cease operating - see also CUTOUT, CUT OUT, have one's WORK cut out

cut up *vt* 1 to cut into parts or pieces 2 to injure, damage, or destroy (as if) by cutting 3 to subject to hostile criticism; censure ~ *vi*, NAM to behave in a comic, boisterous, or unruly manner - see also CUTUP, CUT UP

cut *n* 1 something that is cut or cut off: e.g. 1a a length of cloth varying from 40 to 100 yards (44 to 109 metres) in length 1b the yield of products cut, esp during one harvest 1c a (slice cut

from a) piece from a meat carcass or a fish 2 a product of cutting: e.g. 2a a canal, channel, or inlet made by excavation or worn by natural action 2b(1) an opening made with an edged instrument 2b(2) a wound made by something sharp; a gash 2c a surface or outline left by cutting 2d a passage cut for a road, railway, etc 2e a pictorial illustration 3 the act or an instance of cutting: e.g. 3a a gesture or expression that hurts the feelings 3b a straight or easy passage or course 3c a stroke or blow with the edge of a knife or other edged instrument, weapon, etc 3d a lash (as if) with a whip 3e the act of reducing size or amount or removing a part <a ~ in pay> <a ~ in a play> 3f an act or turn of cutting cards; also the result of such cutting 3g the reduction in the number of players in a golf tournament, made at the end of a day's play <beat the ~ with a score of 22> 4a a sharp downward blow or stroke (e.g. of a racket or table-tennis bat); also backspin 4b an attacking stroke in cricket played towards the OFF SIDE with the bat held horizontally 5 an abrupt transition from one sound or image to another in films, radio, or television 6a the shape and style in which a thing is cut, formed, or made <clothes of a good ~> 6b a pattern, type 7 a haircut 8 informal a share <took his ~ of the profits> 9 slang a single song or other item on an LP; TRACK 1f(2) - a cut above superior (to); of higher quality or rank (than)

cut adj 1a formed or fashioned by cutting 1b detached by cutting; specif cut from a growing plant <~ flowers> 1c sliced, chopped 1d castrated, gelded 2 indented, lobed <~ leaves> 3 informal drunk

cut and cover *n* a method of tunnel construction in which the underground structure is built at the bottom of a CUTTING (excavation through high ground) that is then refilled to the previous ground level

cut-and-dried also **cut-and-dry** *adj* 1 completely decided; not open to further discussion 2 being or done according to a simple, standard, or well-known plan, rule, method, etc [orig applied to herbs prepared for use, not growing or fresh]

cut-and-run *adj* involving a hasty escape or withdrawal [orig referring to the cutting of a ship's anchor cable in order to sail without delay]

cut and thrust *n* purposeful, determined, and spirited action characteristic of a struggle <the ~ of the shopfloor> - *The Guardian*

cutaneous /kyooht'aynyas, -ni-as/ *adj* of or affecting the skin [NL *cutaneus*, fr L *cutis* skin - more at HIDE] - **cutaneously** *adv*

cutaway /'kuta,way/ *adj* having or showing parts cut away or absent (to reveal the interior)

cutaway *n* 1 a man's coat, popular in the 19th century, that has skirts tapering from the front waistline to form tails at the back 2a a cutaway picture or representation 2b a shot that interrupts the main action of a film or television programme to take up a related subject or to show action supposed to be going on at the same time as the main action

cutback /'kut,bak/ *n* 1 something cut back 2 a reduction <~s in education due to lack of money>

cute /kyooht/ *adj* 1 clever, shrewd 2 attractive or pretty, esp in a dainty or delicate way 3 painfully arch; mawkish [short for *acute*] - **cutely** *adv*, **cuteness** *n*

cutesy /kyoohtsi/, **cutesy-ple** *adj*, *derog* CUTE 2,3

cut-eye *n*, W1 a usu insulting gesture of catching somebody's eye and then closing or averting one's eyes

cut glass *n* glass ornamented with patterns cut into its surface by an abrasive wheel and then polished

Cuthbert /'kuthbat/, Saint 635?-687 English monk and missionary; converted the Northumbrians to Christianity

cuticle /kyoohtikl/ *n* 1 a skin or outer covering: e.g. 1a an often thick or horny layer forming the outer protective covering of many invertebrate animals (e.g. crabs, insects, and worms) 1b the outermost layer of the skin of humans and other vertebrate animals; EPIDERMIS 1a 1c a thin waxy film of cutin coating the external surface of many plants 2 dead or horny skin; esp that surrounding the base and sides of a fingernail or toenail [L *cuticula*, dim. of *cutis* skin - more at HIDE] - **cuticular** *adj*

cutie, **cutey** /kyoohti/ *n*, informal an attractive person; esp a pretty girl [cute + -ie]

cutie-pie *adj*, informal odiously sweet <child stars with ~ accents>

cutin /kyoohtin/ *n* a water-repellent substance containing waxes and fats, that becomes impregnated into plant cell walls and forms a continuous layer on the external surface of plants [ISV, fr L *cutis*]

cutin-ization, **-ization** /kyoohtinie'zaysh(ə)n/ *n* the impregnation or coating of plant cell walls with cutin - **cutinized** *adj*

cutis /kyoohtis/ *n*, pl *cutes* /kyoohteez/, **cutises** DERMIS (inner layer of the skin) [L]

cutlass also **cutlas** /kutilas/ *n* 1 a short curved sword, esp as formerly used by sailors on warships 2 MACHETE (broad heavy

knife) [MF *coutelas*, aug of *coutel* knife, fr L *cultellus*, dim. of *cultus* knife, ploughshare]

cutler /'kutli/ *n* one who deals in, makes, or repairs cutlery [ME, fr MF *coutelier*, fr LL *cultellarius*, fr L *cultellus*]

cutlery /'kutlari/ *n* 1 edged or cutting tools; esp implements (e.g. knives, forks, and spoons) for cutting and eating food 2 the craft or business of a cutler

cutlet /'kutlit/ *n* 1 a small slice of meat from the neck of lamb, mutton, or veal; also a flat mass of minced food in the shape of a cutlet <nut ~> 2 a cross-sectional slice from between the head and centre of a large fish (e.g. cod) - compare STEAK [modif (influenced by *cut*) of Fr *côtelette*, fr OF *costelette*, dim. of *coste* rib, side, fr L *costa* - more at COAST]

cutoff /'kut,of/ *n* 1 (a device for) cutting off 2 something cut off 3 the point, date, or period for a cutoff 4 chiefly NAm SHORTCUT 1 (shorter route than usual) - **cutoff** *adj*

cutout /'kut,owt/ *n* 1 something cut out or off from something else 2 a device for interrupting or switching off an electric current; esp one that is operated automatically by an excessive current - **cutout** *adj*

cut out *adj* naturally fitted or suited <not ~ to be a lawyer>

cut-price *adj* selling or sold at a discount

cutpurse /'kut,puhs/ *n*, archaic a pickpocket

cut-rate *adj*, chiefly NAm cut-price

cutter /'kuta/ *n* 1 one who or that which cuts: e.g. 1a someone whose work is cutting or involves cutting (e.g. of cloth or film) 1b an instrument, machine, machine part, or tool that cuts 2a a ship's boat for carrying stores or passengers 2b a fore-and-aft rigged vessel with one mast, a mainsail, and two headsails set lengthways 2c a small armed boat in government service (e.g. as a coastguard vessel) 3 a category of flue-cured tobacco consisting of the large leaves pulled from the centre of the plant stalk

cutthroat /'kut,throht/ *n* 1 someone likely to cut throats; a murderous thug 2 **cutthroat**, **cutthroat razor** a razor with a rigid steel cutting blade hinged to a case that forms a handle when the razor is open for use

cutthroat *adj* 1 murderous, cruel 2 unprincipled, ruthless <~ competition> 3 played with three players, esp instead of a usual four <~ bridge>

cutting /'kuting/ *n* 1 something cut (off or out): e.g. 1a a part of a stem or root or a leaf that is cut from a plant and is capable of developing into a new plant 1b a harvest 2 something made by cutting: e.g. 2a a gramophone recording 2b chiefly Br an excavation through a hill or other area of high ground for a canal, road, railway, etc 2c chiefly Br an item (e.g. a photograph or advertisement) cut out of a publication

cutting *adj* 1 given to or designed for cutting; esp sharp, edged 2 of wind marked by sharp piercing cold 3 intended or likely to wound the feelings of another; esp sarcastic <a ~ remark> 4 intense, piercing - **cuttingly** *adv*

cutting edge *n* 1 a quality of sharp directness, esp in speaking or writing 2 the most advanced position, where important action is taken <at the ~ of new technology>

cutting grass *n* 1 any of various sedges or grasses of Australia, New Zealand, and tropical America that have sharp-edged leaves or stems 2 WA/ CANE RAT

cuttlebone /'kutl,bohn/ *n* the internal shell of the cuttlefish, used for supplementing the diet of cage birds with minerals or in powdered form for polishing

cuttlefish /'kutl,fish/ *n* a 10-armed marine invertebrate animal (family Sepiidae of the class Cephalopoda, phylum Mollusca) related to the squids and octopuses and differing from the squids in having a hard internal shell [ME *cotul*, fr OE *cudele*]

cutty /'kuti/ *adj*, chiefly Scot (cut) short [²cut + -y]

cutty stool *n* a seat in a Scottish church where offenders formerly sat for public rebuke

cutup /'kut,up/ *n*, NAm a person who entertains others by behaving in an amusing way

cut-up *n* an artistic composition (e.g. a novel or film) consisting of rearranged fragments of other works

cut-up *adj* deeply distressed; grieved <he's very ~ about the engagement>

cutwater /'kut,wawt/ *n* the foremost part of a ship's bow

cutworm /'kut,wuhm/ *n* any of various caterpillars (family Noctuidae) active chiefly at night, many of which feed on plant stems near ground level

cuvette /kyooht'vet/ *n* a small often transparent laboratory vessel; specif one for holding samples to be investigated in a spectrophotometer [Fr, dim. of *cuve* tub, fr L *cupa* - more at CUP]

Cuvier /kyooht'vay/, Baron Georges Léopold Chrétien Frédéric Dagobert 1769-1832 French naturalist: best known for his comparisons of fossil remains with the anatomy of existing species

Cuzco, **Cusco** /'kooskoh/ city in S Peru; capital of Cuzco department; once capital of the Inca empire; est. pop. 236,000 (1985)

informal CINEMA 1b, 2 <what's on at the ~s?> **synonyms** see CINEMA [ME, fr L *pictura*, fr *pictus*, pp of *pingere* to paint – more at PAINT]

picture *vt* 1 to paint or draw a representation, image, or visual conception of; depict 2 to describe graphically in words 3 to form a mental image of; imagine

picture book *n* a book, esp for young children, that consists wholly or chiefly of pictures

picture card *n* COURT CARD (jack, queen, or king)

picture-frame *adj*, of a stage having a proscenium arch

picturegoer /'pikchə, goh/ *n*, chiefly Br a cinemagoer

picture hat *n* a woman's usu decorated hat with a broad brim

picture house *n*, chiefly Br CINEMA 2 – no longer in vogue

picture palace *n*, chiefly Br CINEMA 2 – no longer in vogue

picture-postcard *adj* of a kind characteristically illustrated on picture postcards; picturesque <~ villages>

picture postcard *n* a postcard with a picture or photograph, typically of a holiday resort or place of interest, on one side

picturesque /'pikchə'resk/ *adj* 1 quaint, charming, or striking in appearance 2 evoking striking mental images; vivid <~ language> [Fr & It; Fr *pittoresque*, fr It *pittoresco*, fr *pittore* painter, fr L *pictor*] – **picturesquely** *adv*, **picturesqueness** *n*

picture tube *n* a cathode-ray tube having at one end a screen of luminescent material onto which a beam of electrons is projected, producing visible images

picture window *n* a large usu single-paned window designed to frame an attractive exterior view

picture writing *n* the recording of events or expression of ideas by pictorial symbols; also the record or message portrayed

picturize, -ise /'pikchariez/ *vt* to make a picture of or present in pictures; esp to make into a film – **picturization** *n*

pikul /'pikl/ *n* any of various units of weight used in China and SE Asia; esp a Chinese unit of about 60.5 kilograms (133¹/₃ pounds) [Malay *pikul* to carry a heavy load]

piddle /'pidl/ *vi*, informal 1 to act or work in an idle or trifling manner – often + *about* 2 to urinate [origin unknown]

piddle *n*, informal 1 urine 2 an act of urinating

piddling /'pidlɪŋ/ *adj*, informal trivial, paltry

piddock /'pidɒk/ *n* an invertebrate animal (genus *Pholas* or family Pholadidae of the phylum Mollusca) related to the mussels, clams, oysters, etc that bores holes in wood, clay, and rocks [origin unknown]

pidgin /'piʒɪn/ *n* a simplified mixed language based on two or more languages and used esp for trade between people with different native languages – compare CREOLE [Pidgin English] – **pidginize** *vt*, **pidginization** *n*

Pidgin English *n* an English-based pidgin; esp one originally used in Chinese ports [Pidgin E, modif of E business English]

pie /pie/ *n* 1 MAGPIE 1 2 a variegated animal [ME, fr OF, fr L *pica*; akin to L *picus* woodpecker, OHG *speh*]

pie *n* 1 a dish consisting of a sweet or savoury filling (e.g. fruit or meat) covered or encased by pastry and baked in a container 2a an affair, business <had a finger in every ~> 2b a whole regarded as divisible into shares <giving the poor a larger share of the economic ~> [ME] – **pie in the sky** an illusory hope or prospect of future happiness; misplaced optimism – see also **have a finger in every pie**, **eat humble pie**

pie, chiefly NAM **pl** *n* printers' type that is spilt or mixed [origin unknown]

pie, chiefly NAM **pl** *vt* to spill or throw (type or typeset matter) into disorder

pie *n* a former monetary unit of India and Pakistan worth 1/192 rupee [Hindi *pāi*, fr Skt *pādika* quarter]

pie *adj* [Maori *pai* good] – **be pie on NZ** to be good at or keen on

piebald /'pie,bawld/ *adj* 1 esp of a horse of different colours. 1a spotted or blotched with black and white 1b SKEWBALD 2 composed of incongruous parts; motley [1 pie + bald 3]

piebald *n* a piebald horse or other animal

piece /pees/ *n* 1a a part of a whole; esp a part detached, cut, or broken from a whole <~ of string> 1b a portion marked off <bought a ~ of land> 2 an object or individual regarded as a unit of a kind or class; an example <a ~ of ripe fruit> <fine teak tables copied from antique ~s> 3 a standard quantity (e.g. of length, weight, or size) in which something is made or sold 4a a literary, artistic, dramatic, or musical work 4b a passage to be recited 4c a newspaper or magazine article 5 a gun used for a specified purpose <an artillery ~> – compare FOWLING PIECE 6 a coin, esp of a specified value <a 5-pence ~> 7 a man used in playing a board game; esp a chessman of rank superior to a pawn 8 chiefly Scot a snack 9 slang a woman <she looks a nice ~> 10 slang a large and striking design in graffiti style [ME, fr OF, fr (assumed) VL *pettia*, of Gaulish origin; akin to Bret *pez* piece] – **go to pieces** 1 to lose one's composure; BREAK DOWN 2 to deteriorate utterly; collapse <the money market went to pieces> – **in one piece** unharmed – **piece of one's mind** a

severe scolding – **to pieces** into fragments or parts <jell to pieces as soon as I picked it up>

piece *vt* 1 to repair, renew, or complete by adding pieces; patch – often + *up* 2 to join into a whole – often + *together* <he ~d the story together from the accounts of witnesses> 3 slang to paint in graffiti style – **piecer** *n*

piece by piece *adv* by degrees; piecemeal

pièce de résistance /,pyes də ʀəzɪst'ahn(h)s (Fr pjes də rezistā:s)/ *n*, pl *pièces de résistance* /~/ 1 the chief dish of a meal 2 an outstanding item; a showpiece [Fr, lit., piece of resistance]

piece-dye *vt* to dye after weaving or knitting

piece goods *n* pl cloth fabrics sold from the roll in lengths specified by the customer

piecemeal /'pees,meel/ *adv* 1 one piece at a time; gradually 2 in pieces or fragments; apart [ME *pece-mele*, fr *pece* piece + *-mele* by a portion at a time, fr OE *mælum*, fr *mælum*, dat pl of *mæl* appointed time – more at MEAL]

piecemeal *adj* done, made, or accomplished piece by piece or in a fragmentary way

piece of cake *n*, informal something easily accomplished <thought the job would be a ~>

piece of eight *n* PESO 1 (Spanish coin)

piece rate *n*, **piece-rates** *n* pl a fixed amount paid per unit of piecework; broadly a rate of pay based on output rather than time

piecework /'pees,wuhk/ *n* work that is paid for at a set rate per unit – compare TIMEWORK – **pieceworker** *n*

pie chart *n* a graphical means of showing the composition of a whole (e.g. the total population), each component (e.g. racial group) being represented by a sector of a circle, the size of which is proportional to the magnitude of the component [2 pie]

piecrust /'pie,krust/ *n* the baked pastry covering of a pie

pie /'pie/ *adj* having blotchy markings of two or more colours <a ~ horse> [ME, fr 1 pie + -ed]

pié-à-terre /,pyay ah 'tes (Fr pje a ter)/ *n*, pl *pié-à-terre* /~/ accommodation (e.g. a flat in a city kept by someone who lives in the country) kept for occasional use [Fr, lit., foot to the ground]

piéd flycatcher *n* a common European flycatcher (*Ficedula hypoleuca*), the male of which has black and white plumage in summer

piédmont /'peedmont/ *adj* lying or formed at the base of mountains <~ glaciers> [Piedmont, region of Italy at the foot of the Alps] – **piédmont** *n*

piéd piper *n*, often cap both Ps 1 one who offers strong but delusive enticement 2 a leader who makes irresponsible promises [The Pied Piper of Hamelin, title & hero of a poem by Robert Browning + 1889 E poet]

piéd wagtail *n* a black and white wagtail (*Motacilla alba yarrellii*) that is a European subspecies of the white wagtail and is common in Britain and often seen in urban areas

pie-eyed *adj*, informal drunk [prob fr 3 pie]

pier /piə/ *n* 1 an intermediate support for the adjacent ends of two bridge spans 2a a structure extending into navigable water for use as a landing place or as a breakwater 2b a structure of wooden or metal girders supporting a promenade with stalls, amusements, etc, and extending outwards from the shore at a holiday resort 3 a vertical structural support: e.g. 3a a short section of wall between two openings 3b a pillar that supports the end of an arch, vault, or lintel 3c an auxiliary mass of masonry used to stiffen a wall; a buttress 4 a structural mount (e.g. for a telescope) usu of stonework, concrete, or steel [ME *per*, fr OE, fr ML *pera*]

pierce /'piəs/ *vt* 1a to run into or through as a pointed weapon does; stab 1b to enter or thrust into sharply or painfully 2 to make a hole in or through; perforate 3 to force or make a way into or through <a light ~d the darkness> 4 to penetrate with the eye or mind; discern 5 to penetrate sharply so as to move or touch the emotions of <grief ~d his heart> 6 to sound sharply through <a shriek ~d the stillness of the night> 7 of cold to penetrate <the cold ~d them to the bone> ~ *vi* to force a way into or through something [ME *percen*, fr OF *percer*, prob fr (assumed) VL *pertusiare*, fr L *pertusus*, pp of *pertundere* to bore through, fr *per-* through + *tundere* to beat, pound]

Pierce /piəs/, Franklin 1804–1869 US Democratic politician: 14th president of the US (1853–57); failed to halt the growing controversy over slavery

pierced /piəst/ *adj* 1 having holes; esp decorated with perforations 2 having the earlobe punctured for an earring <~ ears>

piercing /'piəsiŋ/ *adj* penetrating: e.g. a loud, shrill <~ cries> b perceptive <~ eyes> c penetratingly cold; biting <a ~ winter wind> d cutting, incisive <~ sarcasm> – **piercingly** *adv*

pier glass *n* a tall mirror; esp one designed to occupy the wall space between two windows

sharia, *sharia* /sha'reeə/ *n* the body of divine law in Islam that governs the religious and secular life of Muslims [Ar *shari'ah*]

sharif /sha'reef/ *n* a descendant of the prophet Muhammad through his daughter Fatima; *broadly* someone of noble ancestry or political preeminence in a predominantly Islamic country [Ar *sharif*, lit., illustrious] - **sharifian** *adj*

Sharjah /'shahjah/ 1 small state of the United Arab Emirates, on the Persian Gulf; pop. 268,722 (1985) 2 city and capital of Sharjah emirate; pop. about 125,000 (1980)

'shark /shahk/ *n* any of numerous mainly marine fishes of medium to large size that have a cartilage skeleton, a long tapering body, gill slits at the sides and a mouth on the underside, and a tough usu dull grey skin. They are typically active predators and are sometimes dangerous to man. [origin unknown]

shark *n* 1 a greedy unscrupulous person who exploits others by usury, extortion, or trickery 2 *NAm informal* somebody who excels greatly, esp in a specified field - compare **WHALE** [prob modif (influenced in form & meaning by 'shark) of Ger *schurke* scoundrel]

shark *vb*, *archaic* *vt* to obtain by illicit means - *vi* to make a living by fraud or trickery

sharkskin /'shahk,skin/ *n* 1 the hide of a shark; also leather made from this 2a a smooth stiff durable fabric in twill or basket weave with small woven designs 2b a smooth crisp fabric with a dull finish made usu of rayon in basket weave

Sharon /sha'rohn/, **Ariel** 1928- Israeli soldier and politician: helped found the Likud coalition, serving as minister of agriculture, defence, and trade and industry; considered chief promoter of the 1982 Israeli invasion of Lebanon; was severely criticized and forced to resign his defence post for allowing a massacre in Palestinian refugee camps by the Lebanese Christian militia

Sharon fruit /'sharon/ *n* a large tomatolike persimmon with a tough bright-orange skin, no seeds, and sweet pulpy orange flesh [Sharon, plain in Israel]

sharp /shahp/ *adj* 1 adapted to cutting or piercing; e.g. 1a having a thin keen edge or fine point 1b biting cold; icy <a ~ wind> 1c composed of hard angular grains; gritty <~ sand> 2a keen in intellect; quick-witted 2b keen in perception; acute <~ sight> 2c keen in attention; vigilant <keep a ~ lookout> 2d paying shrewd usu selfish attention to personal gain <a ~ trader> 3 keen in action or manner: e.g. 3a full of activity or energy; vigorous <a ~ trot> 3b capable of acting or reacting strongly; esp caustic <a ~ soap> 4 severe, harsh: e.g. 4a inclined to or marked by irritability or anger; fiery <a ~ temper> 4b causing intense usu sudden anguish <a ~ pain> 4c cutting in language or implication <a ~ rebuke> 5 affecting the senses or sense organs intensely: e.g. 5a(1) pungent, tart, or acid, esp in flavour <~ cheese> 5a(2) acid 5b having a shrill or piercing sound 5c issuing in a brilliant burst of light <a ~ flash> 6a characterized by hard lines and angles <~ features> 6b involving an abrupt change in direction or one at an acute angle <a ~ turn> 6c clear in outline or detail; distinct <a ~ image> 6d conspicuously clear <~ contrast> 7 of a musical note 7a raised by a semitone <F ~> 7b higher than the intended pitch - compare **FLAT** 9 *informal* stylish, dressy [ME, fr OE *scearp*; akin to OE *scieran* to cut - more at **SHEAR**] - **sharply** *adv*, **sharpness** *n*

synonyms Sharp, keen, and acute can all mean "showing alert competence". Sharp suggests quickness of perception and a certain clever and perhaps tricky resourcefulness. Keen implies skill in quick analysis <a keen discussion>. Acute emphasizes discrimination and penetration <as the acute reader will not have failed to note - Havelock Ellis>. **antonyms** dull, blunt

sharp *adv* 1 in a sudden quick manner; sharply <the car pulled up ~> 2 exactly, punctually <4 o'clock ~> 3 above the proper musical pitch - compare **FLAT** 3

note Sharp as an adverb is chiefly used in certain fixed phrases, and cannot replace sharply, the usual adverb <~ speak sharply to him> <sharply contrasted colours>.

sharp *n* 1 one who or that which is sharp: e.g. 1a (a character on the musical stave indicating) a note one semitone higher than a specified note 1b a relatively long needle with a sharp point and a small rounded eye, for use in general sewing 1c *NAm* a real or self-styled expert 2 chiefly *NAm* a swindler, sharper

Sharp /shahp/, **Cecil James** 1859-1924 English folk musician: collector of folk songs and dances; founded English Folk Dance Society (1911); author of *English Folk Song - Some Conclusions* (1907)

sharpen /'shahpən/ *vt* to make sharp or sharper <~ a pencil> <~ a musical note> - compare **FLATTEN** 2 - *vi* to grow or become sharp or sharper - **sharpen** *n*

sharp end *n* the active area or part of an industry or organization; **FRONT LINE** 2

sharpening stone /'shahpənɪŋ/ *n* a stone with which edge tools can be sharpened by rubbing; a whetstone

sharper /'shahpə/ *n* a cheat, swindler; esp a gambler who habitually cheats ['sharp + -er]

sharp-eyed *adj* having keen sight; also keenly observant or penetrating

sharpie, **sharp** /'shahpi/ *n*, *NAm informal* an exceptionally shrewd or cunning person; esp a sharper

sharpish /'shahpɪʃ/ *adv*, *Br informal* with haste; somewhat quickly <we'd better move ~ to get some tea>

sharp-nosed *adj* 1 having a pointed nose or snout 2 having a keen sense of smell

sharp practice *n* dealing in which advantage is taken or sought unscrupulously

sharp-set *adj* 1 set at a sharp angle or so as to present a sharp edge 2 eager for food; very hungry - **sharp-setness** *n*

sharpshooter /'shahp,shoohtə/ *n* a good marksman - **sharp-shooting** *n*

sharp-sighted *adj* 1 having acute vision 2 mentally keen or alert; sharp-witted - **sharp-sightedly** *adv*, **sharp-sightedness** *n*

sharp-tongued *adj* cutting or sarcastic in speech; quick to rebuke

sharp-witted *adj* having or showing acute discernment or mental alertness

shashlik also **shashlick** /,shahsh'lik, 'shahslik/ *n* a kebab [Russ *shashlyk*, of Turkic origin]

Shastri /'shastri/, **Shri Lal Bahadur** 1904-1966 Indian politician: held several government posts before succeeding Nehru as prime minister (1964-66); his term in office saw frontier war with Pakistan; signed ceasefire agreement at Tashkent shortly before his death

shat /shat/ *past & past part* of SHIT

Shatt-al-Arab /,shat,al'arab/ river estuary in SE Iraq, formed by the rivers Tigris and Euphrates, and flowing SE into the Persian Gulf; 193 km (120 miles) long

shatter /'shatə/ *vt* 1a to break into pieces (e.g. by a sudden blow) 1b to cause to break down; impair, disable <his nerves were ~ed> 2 to cause the disruption or annihilation of; wreck 3 *informal* to have a forceful or violent effect on the feelings of <she was absolutely ~ed by the news> 4 *informal* to cause to be utterly exhausted <felt ~ed by the long train journey> - *vi* 1 to break suddenly apart; disintegrate 2 to drop leaves, petals, fruit, etc <the wheat ~ed in the fields> [ME *schateren*] - **shatteringly** *adv*

shatter *n* 1 pl fragments, shreds <the broken vase lay in ~s> 2 an act of shattering; the state of being shattered

shatterproof /'shatə,pru:hf/ *adj* made so as not to shatter <~ glass>

shave /shayv/ *vb* shaved, **shaven** *vt* 1a to remove in thin layers or shreds - often + off <~ off a thin slice of cheese> 1b to cut off thin layers or slices from <~ a board with a plane> 1c to cut or trim closely <a closely ~d lawn> 2a to remove the hair from (a part of the body) by cutting close to the roots 2b to cut off (hair or beard) close to the skin 3 to come very close to or brush against in passing 4 *NAm* to discount (a note) at an exorbitant rate - *vi* to cut off hair or beard close to the skin [ME *shaven*, fr OE *scafan*; akin to L *scabere* to scratch, *capo capon*]

shave *n* 1 a tool or machine for shaving 2 a thin slice; a shaving 3 an act or process of shaving 4 an act of narrowly missing or avoiding something (e.g. a source of danger or risk) <that was a close ~>

shavehook /'shayv,hook/ *n* a tool for scraping that has a usu triangular blade set at right angles to a shaft

shaveling /'shayvlɪŋ/ *n* 1 chiefly *derog* a tonsured clergyman; a priest 2 *archaic* a stripling

shaver /'shayvə/ *n* 1 an implement or machine for shaving; specif an electric-powered razor 2 *informal* a boy, youngster 3 *archaic* a swindler

shavetail /'shayv,tayl/ *n*, *NAm* a pack mule, esp when newly broken in [fr the practice of shaving the tails of newly broken mules to distinguish them from untrained ones]

Shavian /'shayvyan/ *n* an admirer or devotee of George Bernard Shaw, his writings, or his social and political theories [Shavian, latinized form of Shaw] - **Shavian** *adj*, **Shavianism** *n*

shaving /'shayvɪŋ/ *n* 1 the action of one who or that which shaves 2 *usu pl* something shaved off <wood ~s>

shaving brush *n* a brush for applying soap to the face before shaving

shaving cream *n* a mixture made mostly of soap, that keeps the hair soft and wet while one shaves

shaving foam *n* shaving cream, usu from an aerosol

shaving soap *n* a soap that produces a thick lather for shaving

pumpnickel /'pʌmp,nɪkl/ *n* a dark coarse slightly sour-tasting bread made from wholemeal rye [Ger]

pumpkin /'pʌm(p)kɪn/ *n* 1 the very large edible usu round deep yellow fruit of a type of vegetable marrow; also a usu hairy prickly plant that bears pumpkins 2 *Br* (the large fruit of) any of various cultivated squashes derived from a natural species (*Cucurbita maxima*) [alter. of earlier *pumpion*, modif of Fr *popon*, *pompon* melon, pumpkin, fr L *pepon-*, *pepo*, fr Gk *pepón*, fr *pepón* ripened; akin to Gk *pessein* to cook, ripen - more at *COOK*]

pump priming *n* government investment expenditure designed to induce a self-sustaining expansion of economic activity

pump room *n* a room at a spa in which the water is distributed and drunk

1 pun /'pʌn/ *vt* 1 to consolidate (e.g. earth, concrete, or hardcore) by repeated ramming or pounding 2 to drive a metal rod repeatedly through (wet concrete) to distribute cement and aggregate evenly [ME *pounen* - more at ²*POUND*]

2 pun *n* a witticism involving the use of a word with more than one meaning, or of words having the same, or nearly the same, sound but different meanings [prob short for obs *punnet*, *pundigion*, perh alter. of It *puntiglio* fine point, quibble - more at *PUNCTILIO*]

3 pun *vi* -*nn*- to make puns

puna /'puʊnə/ *n* 1 a treeless windswept tableland or basin in the higher Andes 2 MOUNTAIN SICKNESS [AmerSp, fr Quechua]

punch /'pʌntʃ/ *vt* 1a to strike, esp with a hard and quick thrust of the fist 1b to drive or push forcibly (as if) by a punch 1c to hit (a ball) with less than a full swing (e.g. of a bat or racket) 2 to emboss, cut, perforate, or make (as if) with a punch 3 *NAm* to drive, herd <~ cattle> ~ *vi* to punch something [ME *punchen* to prod, prick, fr MF *poinçonner* to prick, stamp, fr *poinçon* puncheon] - **puncher** *n*

punch in *vi*, *NAm* CLOCK IN

punch out *vi*, *NAm* CLOCK OUT

2 punch *n* 1 the action of punching 2 a blow (as if) with the fist 3 effective energy or forcefulness <an opening paragraph with a lot of ~> <a minority group with no political ~> - **punchless** *adj* - **beat somebody to the punch** *informal* to act or speak before somebody; preempt somebody <wanted to tell them the news but the others beat us to the punch> - **pull one's punches** *informal* to refrain from using all the force at one's disposal; esp to refrain from criticizing as severely as one might

3 punch *n* 1 a tool esp for perforating, embossing, or cutting, usu in the form of a short rod of steel shaped in any of several ways at one end; also a short tapering steel rod for driving the heads of nails below a surface 2 a steel die, faced with a letter in relief, that is forced into a softer metal to form an incised matrix from which foundry type is cast 3 a device for cutting holes or notches in paper or cardboard [prob short for *puncheon*]

4 punch *n* a hot or cold drink usu composed of wine or spirits, fruit, spices, water, and sometimes tea; also a similar drink composed of nonalcoholic liquids - compare *CUP* 6 [perh fr Hindi *pāc* five, fr Skt *pañca*; akin to Gk *pente* five; fr the number of ingredients]

Punch-and-Judy show /'pʌntʃ,ən 'joʊdi/ *n* a traditional puppet show in which the little hook-nosed humpback Punch fights comically with his wife Judy

'punch-bag *n* 1 an inflated or stuffed bag or ball which is punched with the fists as a form of exercise or training 2 someone victimized as a butt or stooge <the prevailing view of woman as a work-horse, cook and procreative ~ - *British Book News*>

punchball /'pʌntʃ,bɔ:l/ *n* baseball adapted to playing in small areas and marked by the use of a rubber ball hit with a closed fist instead of a bat

'punch-,ball *n*, *Br* a punch-bag

punch bowl *n* a large bowl in which a drink, esp punch, is mixed and served

'punch-,drunk *adj* 1 suffering brain damage from many minute brain haemorrhages, as a result of repeated head blows received in boxing 2 behaving as if punch-drunk; dazed, confused [²*punch*]

punched card, punch card *n* a card in which a pattern of holes or notches has been cut to represent information or instructions, and which is used in data processing

1 puncheon /'pʌntʃ(ə)n/ *n* 1a a short upright timber for a frame, esp to carry a load (e.g. a roof) 1b a split log or heavy slab with the face smoothed 2 ³*PUNCH*; esp a die used by goldsmiths, cutlers, and engravers [ME *ponson* pointed tool or weapon, king post (perh fr its being marked by the builder with a pointed tool), fr MF *poinçon*, fr (assumed) VL *punction-*, *punctio* pointed tool, fr *punctiare* to prick, fr L *punctus*, pp of *pungere* to prick - more at *PUNGENT*]

2 puncheon *n* 1 a large cask of varying capacity 2 any of various units (e.g. of 70 or 120 gallons) of liquid capacity [ME *poncion*, fr MF *ponchon*, *poinçon*, of unknown origin]

Punchinello /'pʌntʃi'nəloh/ *n*, *pl* **punchinellos** a short fat humpbacked clown or buffoon in Italian puppet shows [modif of It dial. *polecenella*, dim. of It *pulcino* chicken, fr LL *pulicenus*, dim. of L *pullus*]

punching bag /'pʌntʃɪŋ/ *n*, chiefly *NAm* a punch-bag

punch line *n* a sentence or phrase, esp a joke, that forms the climax to a speech or dialogue and makes the point - compare *FEED-LINE*

punch press *n* a press equipped with cutting, shaping, or combination dies for working on material (e.g. metal)

'punch-,up *n*, chiefly *Br* *informal* a usu spontaneous fight or brawl, esp with the bare fists

punchy /'pʌntʃi/ *adj* having punch; forceful

punctate /'pʌŋ(k)tayt/ *adj* 1 marked with minute spots or depressions <a ~ leaf> 2 occurring in dots or points <~ skin lesions> [NL *punctatus*, fr L *punctum* point - more at *POINT*] - **punctuation** *n*

punctilio /'pʌŋ(k)'tiliəh/ *n*, *pl* **punctillos** 1 a minute detail of conduct in a ceremony or in observance of a code 2 careful observance of forms (e.g. in social conduct) [It & Sp; It *puntiglio* point of honour, scruple, fr Sp *puntillo*, fr dim. of *punto* point, fr L *punctum*]

punctilious /'pʌŋ(k)'tiliəs/ *adj* strict or precise in observing the details of codes of conduct, conventions, or duties **synonyms** see *CAREFUL* - **punctiliously** *adv*, **punctiliousness** *n*

punctual /'pʌŋ(k)'tʃooəl, -tyoo-/ *adj* 1 *maths* relating to or having the nature of a point 2 (habitually) arriving, happening, performing, etc at the exact or agreed time; prompt <a ~ businessman> [ML *punctualis*, fr L *punctus* pricking, point, fr *punctus*, pp of *pungere* to prick - more at *PUNGENT*] - **punctually** *adv*, **punctualness** *n*, **punctuality** *n*

punctuate /'pʌŋ(k)'tʃoo,ayt, -tyoo-/ *vt* 1 to mark or divide (written matter) with punctuation marks 2 to break into or interrupt at intervals <the steady click of her needles ~d the silence - Edith Wharton> ~ *vi* to use punctuation marks [ML *punctuatus*, pp of *punctuare* to point, provide with punctuation marks, fr L *punctus* point] - **punctuator** *n*

punctuation /'pʌŋ(k)'tʃoo,aysh(ə)n, -tyoo-/ *n* 1 punctuating or being punctuated 2 the act or practice of inserting standardized marks or signs in written matter to clarify the meaning and separate structural units; also a system of punctuation

punctuation mark *n* any of various standardized marks or signs (e.g. a comma) used in punctuation

1 puncture /'pʌŋ(k)'tʃə/ *n* 1 an act of puncturing 2 a perforation (e.g. a hole or narrow wound) made by puncturing; esp a small accidental hole in a pneumatic tyre 3 a minute natural depression in a body part [L *punctura*, fr *punctus*, pp of *pungere*]

2 puncture *vt* 1 to pierce with a pointed instrument or object 2 to cause a puncture in 3 to make useless or deflate as if by a puncture <failures ~d his confidence> ~ *vi* to become punctured

punctured /'pʌŋ(k)'tʃəd/ *adj* punctate

pundit /'pʌndɪt/ *n* 1 a learned man; a teacher; *specif* a pandit 2 one who gives opinions in an authoritative manner; an authority, expert [Hindi *pandit*, fr Skt *pāṇḍita*, fr *pāṇḍita* learned] - **punditry** *n*

Pune /'puʊnə/, formerly *Poona* city in W India, in Maharashtra state, ESE of Bombay; important administrative, cultural, and communications centre; university; pop. 1,203,351 (1981)

pungency /'pʌŋjənsi/ *n* the quality or state of being pungent

pungent /'pʌŋ(j)ənt/ *adj* 1 of a leaf or leaflet having a stiff and sharp point 2 sharply painful; also poignant 3a sharply incisive; caustic <a ~ denunciation> 3b to the point; highly expressive <~ prose> 4 having a strong sharp smell or taste; esp acrid **antonym** bland [L *pungent-*, *pungens*, prp of *pungere* to prick, sting; akin to L *pugnis* fist, *pugnare* to fight, Gk *pygmē* fist] - **pungently** *adv*

1 Punic /'pyʊəhnik/ *adj* of Carthage or the Carthaginians [L *punicus*, fr *Poenus* inhabitant of Carthage, modif of Gk *Phoinix* Phoenician]

2 Punic *n* the Phoenician dialect of ancient Carthage

punish /'pʌnɪʃ/ *vt* 1a to impose a penalty on for a fault, offence, or violation 1b to inflict a penalty for (an offence) 2 *informal* to treat roughly, harshly, or damagingly <to ~ an engine> ~ *vi* to inflict punishment [ME *punissen*, fr MF *puniss-*, stem of *punir*, fr L *punire*, fr *poena* penalty - more at *PAIN*] - **punishable** *adj*, **punisher** *n*, **punishability** *n*

synonyms Punish, chastise, chasten, castigate, discipline, penalize. Punish implies a penalty for wrongdoing, such as a fine, imprisonment, or the infliction of pain. Chastise now usually implies corporal punishment, but may be used for a severe rebuke. In either case, chastisement is intended to

actinomyces /aktinoh'mieset, -mies/ *n* any of an order (Actinomycetales) of threadlike or rod-shaped bacteria including streptomyces and streptomyces [deriv of Gk *aktin-* 'aktin-' + *mykes* - 'mykes']

actinomycin /aktinoh'miesin/ *n* any of various red or yellow antibiotics that are obtained from soil bacteria (esp. *Streptomyces antibioticus*)

actinomyces /aktinoh'mieset, -mies/ *n* infection with or disease caused by actinomycetes; esp. a long-lasting disease of cattle, sheep, and human beings characterized by hard swollen masses in the mouth and jaw [NL] - **actinomycetosis** *n*

actinon /aktinoh'noh/ *n* a gaseous radioactive isotope of the element radon that has a half-life of about 4 seconds [NL, fr. *actin-* + *on*]

actinium /aktinoh'yoo'raynyom/ *n* the isotope of the element uranium having a mass number of 235 [NL, fr. *actin-* + *ium*]

actinophore /aktinoh'zoh'n/ *n*, zoology an anthozoan [actin- + *phore* 'phore']

actin /aktinoh'zoh'n/ *n*, zoology an anthozoan [actin- + *in* 'in']

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active

compare PASSIVE 2f 11b of an electronic device using electrical power for amplifying or controlling an electrical signal < transistors and valves are ~ devices > - compare PASSIVE 2d **synonyms** see LIVELY **antonyms** inactive, lethargic [ME, fr. MF or L, MF *acti*, fr. L *actus*, pp of *agere* to drive, do - more at AGENT] - **actively** *adv*, **activeness** *n*

active *n* 1 an active verb form 2 the active voice of a language **active immunity** *n* immunity that is usu long-lasting and is acquired through production of antibodies within a living organism in response to the presence of antigens - compare PASSIVE IMMUNITY

active site *n* a part of the surface of an enzyme molecule that is shaped so as to fit closely with a molecule of the chemical compound that the enzyme acts on

active suspension *n* a computerized suspension system for motor vehicles, which operates by means of sensors relaying information on the vehicle's attitude to a central computer which automatically adjusts the suspension to give a smooth ride

active transport *n* movement of a chemical substance across a (cell) membrane in living tissue by the expenditure of energy esp against a gradient of concentration or electrical potential and usu opposite to the direction of normal diffusion

activism /akti'viz(ə)m/ *n* a doctrine or practice that emphasizes direct vigorous action (e.g. the use of mass demonstrations) in support of or opposition to one side of a controversial issue - **activist** *n* or *adj*, **activistic** *adj*

activity /ak'ti:v(ə)ti/ *n* 1 the quality or state of being active 2 vigorous or energetic action; liveliness, assiduity 3 natural or normal function; e.g. 3a a process (e.g. digestion) that an organism carries on or participates in by virtue of being alive 3b a process actually or potentially involving mental function; specif. an educational procedure designed to stimulate learning by firsthand experience 4 *usu pl* a pursuit in which a person is active < social activities > 5 chemistry 5a the capacity of a substance to react 5b a measure of the effective concentration or intensity of a particular substance in a given chemical system

activity rate *n* the proportion of a population that is of working age

act of faith *n* an action demonstrating the strength of one's esp religious convictions

act of God *n* a sudden event, esp a catastrophe, brought about by uncontrollable natural forces

actomyosin /aktoh'miesin/ *n* a protein complex in muscle that is formed by the linkage of actin and myosin and that is involved together with the energy storing chemical compound ATP in muscular contraction [ISV *actin* + *o-* + *myosin*]

acton /aktun/ *n* a padded jacket worn under a coat of mail; also a jacket plated with mail [ME *aketoun*, fr. OF *aketon*, deriv of *Ar-qutun* (the cotton)]

Acton /aktun/, 1st Baron 1834-1902 (John Emerich Edward Dalberg-Acton) English historian: Liberal MP and friend of Gladstone; taught modern history at Cambridge from 1895

actor /aktə/, fem *actress* /aktis/ *n* one who represents a character in a dramatic production; esp one whose profession is acting - **actorish** *adj*

Acts /akts/, Acts of the Apostles *n* taking sing *vb*, Bible the fifth book of the New Testament, narrating the beginnings of the Christian Church - see BIBLE table (p.153)

ACTU *abbr* Australian Council of Trade Unions

actual /aktjuo(ə)l, -choo(ə)l/ *adj* 1 existing in fact or reality rather than as something potential, apparent, or imagined; genuine < ~ poverty > < ~ and imagined conditions > 2 existing or occurring at the time; current < caught in the ~ commission of a crime > 3 *obs active* **antonyms** ideal, imaginary [ME *actual*, fr. MF, fr. LL *actualis*, fr. L *actus* act] - **actualize** *vt*, **actualization** *n*

actual cash value *n* the amount necessary to replace or restore lost, stolen, or damaged property (e.g. a car); replacement value

actuality /aktjuo'alt(ə), -akchoo/ *n* 1 the quality or state of being actual; reality 2 *often pl* an existing circumstance; a real fact < possible risks which have been seized upon as actualities > - T S Eliot

actually /aktjuo(ə)li, -choo(ə)li/ *adv* 1 in act or in fact; really < nominally but not ~ independent > < I'm not hungry, ~ > 2 at the present moment < the party ~ in power > 3 strange as it may seem, even < she ~ spoke Latin >

actuary /aktjuo'et(ə), -akchoo/ *n* 1 a statistician who calculates insurance risks, premiums, annuities, etc 2 *obs* a clerk, registrar [L *actuarius* shorthand writer, fr. *actum* record - more at ACT] - **actuarial** *adj*, **actuarially** *adv*

actuate /aktjuo'et(ə), -choo/ *vt* 1 to put into (mechanical) action or motion 2 to incite to action < ~d by greed > [ML *actuatus*, pp of *actuare*, fr. L *actus* act] - **actuator** *n*, **actuation** *n*

acuity /a'kyoo(ə)ti/ *n* keenness of perception; sharpness [MF *acuité*, fr. OF *acuité*, fr. *agu* sharp, fr. L *acutus*]

aculeate /s'kyoo(ə)liət/ *adj* having a sting < ~ insects > [L *aculeatus* having stings, fr. *aculeus*, dim. of *acus*]

acumen /'akyoomən/ *n* keenness and depth of perception; discernment, or discrimination, esp in practical matters; shrewdness **synonyms** see DISCERNMENT [L *acumen*, *acumen*, lit. point, fr. *acuere*]

acuminate /a'kyoo(ə)minayt/ *adj* tapering to a slender point < an ~ leaf >

acupressure /'ak(y)oo, preshə/ *n* the application of

The
AMERICAN
HERITAGE®
STEDMAN'S
Medical
dic·tion·ar·y



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curved line representing variations in data on a graph.
—*v.* To move in or take the shape of a curve.

curve of occlusion *n.* 1. A curved surface that makes simultaneous contact with the major portion of the incisal and occlusal prominences of the existing teeth. 2. The curve of a dentition on which the occlusal surfaces lie.

Cush-ing (kōōsh'ing), **Harvey Williams** 1869–1939. American surgeon known for his innovations in the field of neurosurgery and for his studies of the pituitary gland.

cush-ing-oid (kōōsh'ing-oid') *adj.* Resembling the signs and symptoms of Cushing's disease or Cushing's syndrome.

Cush-ing's syndrome (kōōsh'ingz) *n.* A syndrome caused by an increased production of ACTH from a tumor of the adrenal cortex or of the anterior lobe of the pituitary gland. It is characterized by obesity and weakening of the muscles. Also called *Cushing's basophilism*, *Cushing's disease*, *pituitary basophilism*.

Cushing's syndrome med-i-ca-men-to-sus (mēd'i-kə-mən-tō'səs) *n.* A condition that is caused by the chronic administration of large doses of glucocorticoids and that produces the signs and symptoms of Cushing's syndrome.

cush-ion (kōōsh'an) *n.* A padlike body part.

cuspid (kūsp) *n.* 1. A pointed or rounded projection on the chewing surface of a tooth. 2. A triangular fold or flap of a heart valve.

cuspidal (kūsp'pəl) *adj.* Relating to a cusp.

cus-pate (kūsp'pāt') or **cus-pat-ed** (-pāt'id) *adj.* 1. Having a cusp. 2. Shaped like a cusp.

cuspid height *n.* 1. The shortest distance between the tip of a cusp of a tooth and its base plane. 2. The shortest distance between the deepest part of the central fossa of a posterior tooth and a line connecting the points of the cusps of the tooth.

cuspid (kūsp'id) *n.* See **canine tooth**. —*adj.* Having one cusp; cuspidate.

cut (kūt) *v.* 1. To penetrate with a sharp edge; strike a narrow opening in. 2. To separate into parts with or as if with a sharp-edged instrument; sever. 3. To make an incision or a separation. 4. To have a new tooth grow through the gums. 5. To form or shape by severing or incising. 6. To separate from a body; detach. 7. To lessen the strength of; dilute. —*n.* 1. The act of cutting. 2. The result of cutting, especially an opening or wound made by a sharp edge.

cu-ta-ne-o-me-nin-go-spi-nal angiomas (kyōō-tā'nē-ō-mə-nīng'gō-spī'nəl) *n.* See **Cobb syndrome**.

cu-ta-ne-ous (kyōō-tā'nē-əs) *adj.* Of, relating to, or affecting the skin.

cutaneous horn *n.* A protruding keratotic growth of the skin.

cutaneous larva migrans *n.* See **creeping eruption**.

cutaneous leishmaniasis *n.* An endemic disease in northern Africa and western and central Asia that is caused by infection with promastigotes of *Leishmania tropica* and is transmitted by the bite of a sandfly of the genus *Phlebotomus*. It begins as a papule that enlarges to a nodule and then breaks down into an ulcer that leaves

an indented scar. Also called *Old World leishmaniasis*.

cutaneous leprosy *n.* See **tuberculoid leprosy**.

cutaneous muscle *n.* A muscle that lies in the subcutaneous tissue and attaches to the skin, with or without a bony attachment.

cutaneous reaction *n.* See **cutireaction**.

cutaneous tuberculosis *n.* Pathologic skin lesions that are caused by *Mycobacterium tuberculosis*. Also called *scrofuloderma*.

cutaneous vasculitis *n.* A form of vasculitis affecting the skin, often with involvement of other organs, characterized by a polymorphonuclear infiltrate of the small vessels.

cutaneous vein *n.* Any of several veins in the subcutaneous tissue that empty into deep veins.

cut-down (kūt'daun') *n.* The incision of a vein to facilitate the insertion of a cannula or needle, as for the administration of intravenous medication. Also called *venostomy*.

cu-ti-cle (kyōō'tī-kəl) *n.* 1. The strip of hardened skin at the base and sides of a fingernail or toenail. 2. The outermost layer of the skin; epidermis. 3. Dead or cornified epidermis.

cu-ti-re-ac-tion (kyōō'tī-rē-āk'shən) *n.* An inflammatory reaction to a skin test. Also called *cutaneous reaction*.

cu-tis (kyōō'tīs) *n., pl. -tis-es or -tes* (-tēz) *Dermis*.

cutis an-se-ri-na (än'sə-rī'nə) *n.* See **goose bumps**.

cu-ti-sec-tor (kyōō'tī-sēk'tər) *n.* 1. An instrument for cutting small pieces of skin for grafting. 2. An instrument used to remove a section of skin for microscopic examination.

cutis hy-per-e-las-ti-ca (hī'pər-ī-lās'tī-kə) *n.* See **Ehlers-Danlos syndrome**.

cutis lax-a (lāk'sə) *n.* A congenital condition characterized by an excessive amount of skin hanging in folds. Also called *pachydermatocoele*.

cutis mar-mo-ra-ta (mār'mə-rā'tə) *n.* A pink marble-like mottling of the skin caused by exposure to cold temperature or associated with various debilitating diseases.

cutis plate *n.* See **dermatome** (sense 3).

cutis rhom-boi-da-lis nu-chae (rōm'boi-dāl'is nōō'kē, nyōō'-) *n.* A condition in which the skin on the back of the neck becomes leathery and furrowed and appears to have rhomboid configurations, caused by aging or prolonged exposure to sunlight.

cutis ve-ra (vūr'ə) *n.* See **dermis**.

cutis ver-ti-cis gy-ra-ta (vūr'tī-sīs jī-rā'tə) *n.* A congenital condition in which the skin of the scalp is thickened, forming folds and furrows.

cu-vette (kyōō'vèt) *n.* A small, transparent, often tubular laboratory vessel.

CV *abbr.* cardiovascular

CVA *abbr.* cerebrovascular accident

CVP *abbr.* central venous pressure

CVS *abbr.* chorionic villus sampling

CXR *abbr.* chest x-ray

cy-a-nide (sī'ə-nīd') or **cy-a-nid** (-nīd) *n.* Any of various salts or esters of hydrogen cyanide containing a CN

contractions of the heart, especially as palpated at the wrist or in the neck.

pulse deficit *n.* The difference between the heart rate and the palpable pulse, as is often seen in atrial fibrillation.

pulse generator *n.* A device that produces an electrical discharge at regular intervals, which can be modified as needed, as in an electronic pacemaker.

pulse-less disease (pŭls'lis) *n.* A progressive inflammatory disease that causes the arteries arising from the aortic arch to collapse, making it impossible to detect a pulse in the arms and neck, and resulting in a variety of symptoms associated with ischemia, such as temporary loss of consciousness. Also called *Takayasu's disease*, *Takayasu's syndrome*.

pulse oximeter *n.* A device, usually attached to the earlobe or fingertip, that measures the oxygen saturation of arterial blood. —**pulse oximetry** *n.*

pulse pressure *n.* The variation in blood pressure occurring in an artery during the cardiac cycle; the difference between systolic and diastolic pressures.

pulse rate *n.* The rate of the pulse as observed in an artery, expressed as beats per minute.

pulse therapy *n.* A short, intensive administration of pharmacotherapy, usually given at intervals such as weekly or monthly, often used in treating cancer.

pulse wave *n.* The progressive increase of pressure radiating through the arteries that occurs with each contraction of the left ventricle of the heart.

pul-sion (pŭl'shən) *n.* A swelling or pushing outward.

pulsion diverticulum *n.* A diverticulum formed by pressure from within a hollow organ, often causing herniation of the mucous membrane through the muscular layer.

pul-sus (pŭl'səs) *n.* A pulse.

pulsus alternans *n.* See *alternating pulse*.

pulsus cel-er (sĕl'ər) *n.* A pulse beat swift to rise and fall.

pulsus dif-fer-ens (dĭf'ə-rĕnz') *n.* A condition in which the pulses in the two radial arteries differ in strength.

pulsus rar-us (rār'əs) *n.* A pulse beat slow to rise and fall. Also called *pulsus tardus*.

pul-ta-ceous (pŭl-tā'shəs) *adj.* Resembling pulp; pulpy.

pul-vi-nar (pŭl-vī'nər) *n.* The posterior extremity of the thalamus, forming a cushionlike prominence over the posterior aspect of the internal capsule.

pum-ice (pŭm'is) *n.* A light, porous, glassy lava, used as an abrasive.

pump (pŭmp) *n.* 1. A machine or device for raising, compressing, or transferring fluids. 2. A molecular mechanism for the active transport of ions or molecules across a cell membrane. —*v.* 1. To raise or cause to flow by means of a pump. 2. To transport ions or molecules against a concentration gradient by the expenditure of chemically stored energy.

pump lung *n.* See *shock lung*.

pump-ox-y-gen-a-tor (pŭmp-ŏk'sī-jə-nā'tər) *n.* A mechanical device that can substitute for both the heart and lungs during open-heart surgery.

punch biopsy (pŭnch) *n.* Removal of a small cylindrical biopsy specimen by means of an instrument that either directly pierces the tissue or enters through the skin or a small incision in the skin.

punch-drunk *adj.* Showing signs of brain damage caused by repeated blows to the head. Used especially of a boxer.

punch-drunk syndrome *n.* A condition seen in boxers and alcoholics, caused by repeated cerebral concussions and characterized by weakness in the lower limbs, unsteadiness of gait, slowness of muscular movements, hand tremors, hesitancy of speech, and mental dullness.

punch graft *n.* A small graft of the full thickness of the scalp, removed with a circular punch and transplanted in large numbers to a bald area to grow hair.

punc-tate (pŭngk'tāt') *adj.* Having tiny spots, points, or depressions.

punctate hemorrhage *n.* See *petechial hemorrhage*.

punctate hyalosis *n.* A form of hyalosis characterized by minute opacities in the vitreous humor.

punctate keratitis *n.* See *precipitate* (sense 2).

punctate keratoderma *n.* An inherited disorder in which horny papules, often with central craters, develop on the palms, soles, and fingers.

punc-ti-form (pŭngk'tə-fŏrm') *adj.* Very small but not microscopic.

punc-tum (pŭngk'təm) *n., pl. -ta (-tə)* 1. The tip of a sharp anatomical process. 2. A minute round spot differing in color or appearance from the surrounding tissues; a point.

punctum ce-cum (sĕ'kəm) *n.* See *blind spot* (sense 2).

punctum vas-cu-lo-sum (väs'kyə-lŏ'səm) *n.* One of the minute dots seen on a brain section, due to small drops of blood at the cut extremities of arteries.

punc-ture (pŭngk'chər) *v.* To pierce with a pointed object, as with a needle. —*n.* A hole or depression made by a sharp object. Also called *centesis*.

puncture wound *n.* A wound that is deeper than it is wide, produced by a narrow pointed object.

PUO *abbr.* pyrexia of unknown (or uncertain) origin (used of fevers before diagnosis is determined)

pu-pil (pyŏŏ'pəl) *n.* The apparently black circular opening in the center of the iris of the eye, through which light passes to the retina. —**pu/pi-lar** *adj.*

pu-pil-lar-y (pyŏŏ'pə-lĕr'ē) *adj.* Of or affecting the pupil of the eye.

pupillary distance *n.* The distance between the center of each pupil, used in fitting eyeglass frames and lenses.

pupillary membrane *n.* The thin central portion of the iridopupillary lamina occluding the pupil in fetal life.

pupillary reflex *n.* A reflex resulting in change in the diameter of the pupil of the eye.

pupillary-skin reflex *n.* Dilation of the pupil following scratching of the skin of the neck. Also called *ciliospinal reflex*.

pupillary zone *n.* The central region of the anterior surface of the iris of the eye.

pupillo- *pref.* Pupil: *pupillometry*.

pu-pil-lom-e-ter (pyŏŏ'pə-lŏm'i-tər) *n.* An instrument for measuring the diameter of the pupil of the eye.

pu-pil-lom-e-try (pyŏŏ'pə-lŏm'i-trē) *n.* Measurement of the pupil of the eye.

pu-pil-lo-ple-gia (pyŏŏ'pə-lŏ-plē'jə) *n.* A condition characterized by the slow reaction of the pupil to light stimuli.

antigen, as from vaccination or exposure to an infectious disease.

active methyl *n.* A methyl group, bound to a quaternary ammonium ion or a tertiary sulfonium ion, that can take part in transmethylation reactions.

active principle *n.* A constituent of a drug, usually an alkaloid or glycoside, on which the characteristic therapeutic action of the substance largely depends.

active repressor *n.* A repressor that binds directly with an operator gene to block it and its structural genes from synthesizing enzymes; it is a homeostatic mechanism for the regulation of inducible enzyme systems.

active site *n.* The part of an enzyme molecule at which catalysis of the substrate occurs.

active splint *n.* See *dynamic splint*.

active transport *n.* The passage of ions or molecules across a cell membrane against an electrochemical or concentration gradient, or against the normal direction of diffusion.

ac-ti-vin (āk'tā-vīn, āk-tiv'in) *n.* A polypeptide growth factor that is synthesized in the pituitary gland and the gonads and stimulates the secretion of follicle-stimulating hormone.

ac-tiv-i-ty (āk-tiv'i-tē) *n.* 1. A physiological process. 2. The presence of neurogenic electrical energy in electroencephalography. 3. An ideal concentration for which the law of mass action will apply perfectly. 4. The intensity of a radioactive source. 5. The ability to take part in a chemical reaction.

ac-to-my-o-sin (āk'tā-mī'ō-sīn) *n.* A protein complex that is the essential contractile substance of muscle, composed of the globulin myosin and actin.

ac-tu-al cautery (āk'chōō-əl) *n.* An agent or process, such as electrocautery or a hot iron, that cauterizes tissue using heat and not a chemical means.

a-cu-i-ty (ā-kyōō'i-tē) *n.* Sharpness, clearness, and distinctness of perception or vision.

a-cu-le-ate (ā-kyōō'lē-it, -āt') *adj.* Covered with sharp spines; pointed.

a-cu-mi-nate (ā-kyōō'mā-nīt, -nāt') *adj.* Tapering to a point; pointed.

ac-u-pres-sure (ak'yā-prēsh'ər) *n.* See *shiatsu*.

ac-u-punc-ture (āk'yā-pūngk'chər) *n.* A procedure used in or adapted from Chinese medical practice in which specific body areas are pierced with fine needles for therapeutic purposes or to relieve pain or produce regional anesthesia.

a-cute (ā-kyōōt') *adj.* 1. Pointed at the end; sharp. 2. Of or relating to a disease or a condition with a rapid onset and a short, severe course. 3. Of or relating to a patient afflicted with such a disease.

acute abdomen *n.* A serious condition within the abdomen characterized by sudden onset, pain, tenderness, and muscular rigidity, and usually requiring emergency surgery. Also called *surgical abdomen*.

acute adrenocortical insufficiency *n.* A severe phase or attack of a chronic adrenocortical disorder such as Addison's disease, characterized by insufficient amounts of the adrenocortical hormones and resulting in nausea, vomiting, low blood pressure, and life-threatening imbalances in electrolytes. Also called *addisonian crisis*, *adrenal crisis*.

acute African sleeping sickness *n.* See *Rhodesian trypanosomiasis*.

acute alcoholism *n.* See *alcoholism* (sense 3).

acute anterior poliomyelitis *n.* An acute infectious inflammation of the anterior cornua of the spinal cord caused by the poliomyelitis virus and marked by fever, pains, and gastroenteric disturbances, flaccid paralysis, and atrophy of muscular groups. Also called *Heine-Medin disease*.

acute ascending paralysis *n.* Paralysis having a rapid course, beginning in the legs and progressively involving the trunk, arms, and neck. Also called *Landry's paralysis*.

acute brachial radiculitis *n.* See *brachial plexus neuropathy*.

acute brain disorder *n.* An organic brain syndrome that is caused by temporary reversible impairment of brain functioning and is characterized by mood changes that range from mild disorientation to delirium and can include more serious personality and behavior disturbances. Also called *acute neuropsychologic disorder*.

acute bulbar poliomyelitis *n.* A poliomyelitis virus infection affecting nerve cells in the medulla oblongata and causing paralysis of certain motor nerves.

acute care *n.* Short-term medical treatment, usually in a hospital, for patients having an acute illness or injury or recovering from surgery.

acute compression triad *n.* The rising venous pressure, falling arterial pressure, and decreased heart sounds of pericardial tamponade. Also called *Beck's triad*.

acute contagious conjunctivitis *n.* An acute, contagious form of conjunctivitis, caused by the bacterium *Hemophilus aegyptius* and characterized by inflammation of the eyelids and eyeballs and a mucopurulent discharge. Also called *pinkeye*.

acute coronary syndrome *n.* A sudden, severe coronary event that mimics a heart attack, such as unstable angina.

acute disseminated encephalomyelitis *n.* A diffuse inflammation of the brain and spinal cord usually caused by a perivascular hypersensitivity response.

acute epidemic leukoencephalitis *n.* A usually fatal form of leukoencephalitis that is characterized by acute onset of fever, followed by convulsions, delirium, and coma, and is associated with localized hemorrhaging in the central nervous system. Also called *Strümpell's disease*.

acute hemorrhagic conjunctivitis *n.* An acute, endemic form of conjunctivitis usually caused by an enterovirus and characterized by eyelid swelling, tearing, and conjunctival hemorrhages.

acute hemorrhagic pancreatitis *n.* Acute inflammation of the pancreas accompanied by the formation of necrotic areas on the surface of the pancreas and in the omentum and, frequently, also accompanied by hemorrhages into the substance of the gland.

acute idiopathic polyneuritis *n.* A neurologic syndrome, usually following certain virus infections, marked by paresthesia of the limbs and by muscular weakness or a flaccid paralysis. Also called *Guillain-Barré syndrome*, *infectious polyneuritis*, *Landry-*

Guillain-Barré syndrome, *radicular*

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epidemic nonbacteria

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acute necrotizing encep

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the temporal lobes and

acute necrotizing ulcer

See trench mouth.

acute neuropsychologic

disorder.

acute non-lym-pho-cyt

ik) n. See acute myeloge

acute phase response

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acute pro-my-e-lo-cyt-i

ik) n. A severe bleedin

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myelocytes.

acute pulmonary alveoli

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acute respiratory distress

ratory distress syndrome

acute rhinitis

n. See cold.

acute situational reaction

acute trypanosomiasis

asis.

acute tuberculosis

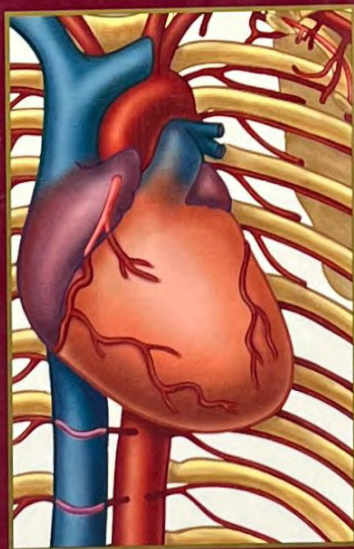
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Cush-ing-Ro-ki-tan-sky ul-cers (koosh'ing ro'ki-tahn'ske) [H.W. Cushing; Karl Freiherr von Rokitansky, Austrian pathologist, 1804-1878] Rokitansky-Cushing ulcers.

cush-ing-oid (koosh'ing-oid) resembling the features, symptoms, and signs associated with Cushing syndrome.

cush-ion (koosh'on) a fleshy, padlike anatomical structure.

anal c's discrete masses of subepithelial tissue, located in the left lateral, right posterior, and right anterior quadrants of the anal canal and consisting of venous plexus, smooth muscle fibers, and elastic and connective tissue; they seal the anal canal and maintain continence.

coronary c. see under *hand*.

digital c. a wedge-shaped mass of white and elastic fibers, containing fat and cartilage, overlying the frog of a horse's foot. Called also *plantar c.*

endocardial c's elevations of embryonic connective tissue covered by endothelium bulging into the atrioventricular canal of the embryonic heart, which later fuse with the free edge of the septum primum to separate the right and left atria.

c. of epiglottis tuberculum epiglotticum.

eustachian c. torus tubarius.

intimal c's longitudinal thickenings of the intima of certain arteries, e.g., the penile arteries, formed by prominent local concentrations of smooth muscle fibers; they serve functionally as valves, controlling blood flow by occluding the lumen of the artery.

Passavant c. see under *bar*.

plantar c. digital c.

sucking c. corpus adiposum buccae.

cus-p (kusp) [L. *cuspis* point] a tapering projection; especially one of the triangular segments of a cardiac valve or a dental cusp.

anterior c. of left atrioventricular valve, anterior c. of mitral valve cusps anterior valvae atrioventricularis sinistae.

anterior c. of pulmonary valve valvula semilunaris anterior valvae trunci pulmonalis.

anterior c. of right atrioventricular valve, anterior c. of tricuspid valve. cusps anterior valvae atrioventricularis dextrae.

c's of aortic valve semilunaris c's of aortic valve.

Carabelli c. an accessory cusp on the lingual aspect of the mesiolingual cusp of an upper molar, which may be unilateral or bilateral and may vary considerably in size; it is common in Caucasians but quite rare in East Asians and certain other groups. Called also *Carabelli tubercle*.

commissural c's cuspides commissurales.

dental c. cuspides dentis.

infundibular c. of tricuspid valve cusps anterior valvae atrioventricularis dextrae.

left c. of aortic valve valvula semilunaris sinistra aortae.

left c. of pulmonary valve valvula semilunaris sinistra valvae trunci pulmonalis.

marginal c. of tricuspid valve cusps posterior valvae atrioventricularis dextrae.

medial c. of tricuspid valve cusps septalis valvae atrioventricularis dextrae.

posterior c. of aortic valve valvula semilunaris posterior aortae.

posterior c. of left atrioventricular valve, posterior c. of mitral valve cusps posterior valvae atrioventricularis sinistae.

posterior c. of right atrioventricular valve, posterior c. of tricuspid valve cusps posterior valvae atrioventricularis dextrae.

c's of pulmonary valve semilunaris c's of pulmonary valve.

right c. of aortic valve valvula semilunaris dextra valvae aortae.

right c. of pulmonary valve valvula semilunaris dextra valvae trunci pulmonalis.

semilunar c's of aortic valve the three semilunar cusps surrounding the aortic valve, officially designated *right*, *left*, and *posterior* for their positions in the fetal heart (TA, *valvula semilunaris dextra aortae*, *sinistra aortae*, and *posterior aortae*), but they are sometimes termed *anterior*, *left posterior*, and *right posterior semilunar cusps*, respectively, for their positions in the adult heart, or *right coronary*, *left coronary*, and *non-coronary*, respectively, for their relations to orifices of the coronary sinuses.

semilunar c's of pulmonary valve the three semilunar cusps surrounding the pulmonary valve, officially designated *right*, *left*, and *anterior* for their positions in the fetal heart (TA, *valvula semilunaris dextra valvae trunci pulmonalis*, *sinistra valvae trunci pulmonalis*, and *anterior valvae trunci pulmonalis*), but they are sometimes termed *right anterior*, *posterior*, and *left anterior semilunar cusps*, respectively, for their positions in the adult heart.

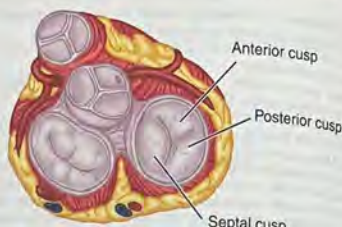
sepal c. of right atrioventricular valve, sepal c. of tricuspid valve cusps sepalis valvae atrioventricularis dextrae.

c. of tooth cuspides dentis.

cus-pid (kus'pid) 1. having one cusp or point. 2. canine tooth.

cus-pi-date (kus'pi-dāt) [L. *cuspidatus*] having a cusp or cusps.

cus-pi-des (kus'pi-dēz) [L.] plural of *cuspid*.



■ Cusps of the atrioventricular (tricuspid) valve.

cus-pis (kus'pis) pl. *cus'pides* [L.] 1. [TA] a tapering projection or structure, applied especially to one of the triangular segments of a cardiac valve. 2. c. dentis.

c. ante'rior val'vae atrioventricu-lar'is dex'trae [TA] the anterior of the cusps of the right atrioventricular valve; called also *anterior cusp of tricuspid valve* and *c. anterior valvae tricuspidalis* [TA alternative].

c. ante'rior val'vae atrioventricu-lar'is sinis'trae [TA] the anterior of the cusps of the left atrioventricular valve; called also *anterior cusp of mitral valve* and *c. anterior valvae mitralis* [TA alternative].

c. ante'rior val'vae mitra-lis TA alternative for *c. anterior valvae atrioventricularis sinistae*.

c. ante'rior val'vae tricuspidalis TA alternative for *c. anterior valvae atrioventricularis dextrae*.

cus'pides commissu-r'ales [TA] commissural cusps: two small cusps that form the two outer of the three scallops constituting the posterior cusp of the left atrioventricular valve. See also *c. posterior valvae atrioventricularis sinistae*.

c. coro-nae c. dentis.

c. denta-lis, c. den-tis [TA] cusp of tooth: an elevation or mound on the crown of a tooth making up part of the occlusal surface; they are named for the tooth surface they are adjacent to, such as *buccal*, *lingual*, and *palatal cusps*. Called also *dental cusp* or *tubercle*. See also *tuberculum dentis*.

c. poste'rior val'vae atrioventricu-lar'is dex'trae [TA] the posterior of the cusps of the right atrioventricular valve; called also *posterior cusp of tricuspid valve* and *c. posterior valvae tricuspidalis* [TA alternative].

c. poste'rior val'vae atrioventricu-lar'is sinis'trae [TA] the posterior of the cusps of the left atrioventricular valve; the term is sometimes used to denote the entire three-scalloped region posterior to the anterior cusp of the mitral valve but at other times is restricted to the central scallop, with the two outer scallops called the cuspides commissurales. Called also *posterior cusp of mitral valve* and *c. posterior valvae mitralis* [TA alternative].

c. poste'rior val'vae mitra-lis TA alternative for *c. posterior valvae atrioventricularis sinistae*.

c. poste'rior val'vae tricuspidalis TA alternative for *c. posterior valvae atrioventricularis dextrae*.

c. sepal-is val'vae atrioventricu-lar'is dex'trae [TA] sepal cusp of right atrioventricular valve: the cusp that is attached to the membranous interventricular septum; called also *sepal cusp of tricuspid valve* and *c. sepalis valvae tricuspidalis* [TA alternative].

c. sepal-is val'vae tricuspidalis TA alternative for *c. sepalis valvae atrioventricularis sinistae*.

cut (kut) a narrow cleft or wound made by a sharp edge.

cu-ta-ne-ous (ku-ta'ne-əs) [L. *cutis* skin] pertaining to the skin; called also *dermal* and *dermic*.

cut-down (kut'down) creation of a small incised opening over a vein to facilitate phlebotomy.

Cu-ter-e-bra (ku'tor-e'bra) a genus of beetles of the family Curculionidae, whose larvae commonly infest rodents.

Cu-te-reb-ri-dae (ku'te-reb'ri-de) a family of New World beetles (order Diptera), the larvae of which parasitize various mammals, including humans. The one genus of medical interest is *Cuterebra*.

cu-ti-cle (ku-ta-kal) [L. *cuticula*, from *cutis* skin] 1. a layer of more or less solid substance covering the free surface of an epithelial cell.

2. epophonium (def. 1).

dental c. cuticula dentis.

enamel c. primary c.

hair c., c. of hair, c. of hair shaft a layer of cells on the external surface of the hair shaft, interlocking with the cuticle of the root sheath.

primary c. a film on the enamel of unerupted teeth, considered to be the final product of degenerating ameloblasts after completion of enamel formation; electron microscopy shows it to consist primarily of ameloblasts of the reduced enamel epithelium attached to the enamel by a basal lamina.

Called also *enamel c.* Cf. *cuticula dentis*.

cuticula the innermost layer of cells of the root sheath adjacent to the hair.

secondary c. cuticula dentis.

cuticula (ku-n'ū-lū) pl. *cuti-culae* [L. "little skin"]

layer. dental cuticle: a film occurring on some teeth, external to the primary cuticle.

c. denta-lis dental cuticle: a film occurring on some teeth, external to the primary cuticle.

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c. denta-lis dental cuticle: a film occurring on some teeth, external to the primary cuticle.

nuclei and gives off widespread cortical projections. In official terminology, called *pulvinar thalami*.

p. tha'lami [TA] official terminology for *pulvinar*.

p. tu'nicae inter'nae segmen'ti arteria'lis anastomo'sis arteriove'nae glomerifor'mis the wall of the internal coat of the arterial segment of the anastomosis arteriovenosa glomeriformis, consisting of three to six layers of contractile glomus cells. Called also *p. tunicae intimae segmenti arterialis anastomosis arteriovenae glomeriformis*.

pul-vi-nate (pul'vī-nāt) [L. *pulvinus* cushion] shaped like a cushion.

pu-mex (pu'mæks) [L.] pumice.

pum-ice (pum'is) [USP] a substance of volcanic origin, consisting chiefly of complex silicates of aluminum, potassium, and sodium, occurring as a very light, hard, rough, porous, grayish powder; used in dentistry as an abrasive or polishing agent, the effect achieved depending on the particle size.

pump (pump) 1. an apparatus for drawing or forcing fluids or gases.
2. to draw or force fluids or gases.

acid p. proton p.

air p. a pump for exhausting or forcing in air.

blood p. a machine used to propel blood through the tubing of extracorporeal circulation devices, designed to do so without damaging blood constituents, particularly the erythrocytes. See also *centrifugal p.* and *roller p.*

breast p. a manual or electric pump for abstracting milk from the breast.

calcium p. the mechanism of active transport of calcium (Ca^{2+}) across a membrane, as of the sarcoplasmic reticulum of muscle cells, against a concentration gradient; the mechanism is driven by the hydrolysis of ATP by the membrane-bound enzyme Ca^{2+} -ATPase.

cardiac balloon p. intra-aortic balloon p.

centrifugal p. a blood pump in which centrifugal force generated by cones or impellers rotating in a closed unit returns the blood to the patient.

electrogenic p. a protein channel pump in which the ion exchange is not one-to-one and hyperpolarization results on one side of the membrane. Cf. *sodium p.*

hydrogen p. proton p.

infusion p. a device for injecting a measured amount of fluid during a specific interval of time.

infusion-withdrawal p. a pump for the simultaneous injection and withdrawal of fluid at the same rate.

insulin p. an externally worn pump that can supply insulin to subcutaneous tissues through a plastic tube; a large bolus is infused before every meal and a continuous basal rate of insulin is maintained at other times. Called also *continuous subcutaneous insulin infusion*.

intra-aortic balloon p. (IABP) a pump used in intra-aortic balloon counterpulsation (q.v.).

Lindbergh p. a perfusion apparatus by means of which an organ removed from the body may be kept alive indefinitely.

muscle p. compression of veins by the contraction of skeletal muscles, forcing blood towards the heart against the flow of gravity; seen particularly in the deep veins of the lower limbs. Called also *venous p.*

Na^+ - K^+ p. Na^+ , K^+ -ATPase.

peristaltic p. a pump that moves liquid through tubing by alternate contractions and relaxations on the tubing.

proton p. a system for transporting protons (hydrogen ions) across cell membranes, often exchanging them for other positively charged ions; it may be driven by energy supplied by ATP metabolism, light, or a flow of electrons. See also *H^+ , K^+ -ATPase*. Called also *hydrogen p.*

roller p. a blood pump in which flow is maintained by the compression of the tubing containing the blood between a continuously moving roller and a curved back plate.

sodium p., sodium-potassium p. Na^+ , K^+ -ATPase.

stomach p. a pump for removing the contents from the stomach.

venous p. muscle p.

pump-kin (pump'kin) an annual vine *Cucurbita pepo*, that produces large, orange fruits with a thick rind and many seeds; the seeds are used for symptomatic relief of benign prostatic hyperplasia; it is also used for a variety of indications in folk medicine.

pump-oxy-gen-a-tor (pump'ok'si-jə-nā'tər) an apparatus, usually extracorporeal, comprising an arterial pump and blood oxygenator plus filters and traps, for saturating blood with oxygen and perfusing the body tissue; used for cardiopulmonary bypass during cardiac surgery.

punch (punch) an instrument for indenting, perforating, or excising a disk or segment of tissue or other material.

biopsy p. a round knife used to remove a small amount of skin or other tissue; see also *punch biopsy*, under *biopsy*.

kidney p., Murphy kidney p. see *Murphy test*, under *tests*.

pin p. an instrument for perforating a metal backing to receive the pins for fastening artificial teeth.

plate p. a punch for cutting out parts of an artificial dental plate.



■ Disposable biopsy punches.

rubber dam p. an instrument for punching holes in a rubber dam in order to permit passage of the dam over the crowns of teeth.

punch-drunk (punch'drunk) boxer's dementia.

punched-out (punch'tout) having the appearance of substance or tissue having been removed with a punch.

punc-ta (punk'tə) [L.] plural of *punctum*.

punc-tal (punk'təl) [L. *punctum*, q.v.] pertaining to the punctum lacrimale.

punc-tate (punk'tāt) [L. *punctum* point] resembling or marked with points or dots.

punc-ti-form (punk'ti-form) [*punctum* + *form*] 1. like a point; located in a point. 2. in bacteriology, denoting very minute colonies.

punc-to-graph (punk'to-graf) [*punctum* + *-graph*] an instrument for the radiographic localization of foreign bodies in the tissues.

punc-tum (punk'təm) pl. *punc'ta* [L.] 1. a tiny spot or point. 2. anatomical nomenclature for a point or other tiny area.

p. cae'cum blind spot.

imperforate p. congenital atresia of the punctum lacrimale, resulting in epiphora; it is particularly common in small breeds of dogs and in pigs.

p. lacrima'le [TA] lacrimal point: the opening on the lacrimal papilla of an eyelid, near the medial angle of the eye, into which tears from the lacrimal lake drain to enter the lacrimal canaliculi.

p. lu'teum macula lutea.

p. ossificatio'nis centrum ossificationis.

p. ossificatio'nis prima'rium centrum ossificationis primarium.

p. ossificatio'nis secunda'rium centrum ossificationis secundarium.

p. prox'imum near point.

p. remo'tum far point.

punc'ta vasculo'sa tiny red spots marking the cut surface of the white substance of the brain, produced by blood from divided vessels.

punc-tum-e-ter (pangk-tum'ə-tər) [*punctum* + *-meter*] an instrument for measuring the range of accommodation.

punc-ture (punk'tchər) [L. *punctura*] 1. the act of piercing or penetrating with a pointed object or instrument. 2. a wound so made.

Bernard p. puncture of the brain of an experimental animal at a specific point of the floor of the fourth ventricle to cause diabetes (*puncture diabetes*) and glycosuria. Called also *diabetic p.*

Blom-Singer p. tracheoesophageal p.



■ Punched-out lesions, most visible in the calvarium, in a lateral view of the skull in multiple myeloma.

EXHIBIT B

DECLARATION OF CHRISTOPHER PALENIK

1. My name is Christopher S. Palenik, Ph.D. I am over 18 years old and competent to make this Declaration. I am a resident of Illinois. The facts stated in this Declaration are true and correct based on my personal knowledge.

2. I have Bachelor's degrees in chemistry and geology and Master's and Ph.D degrees in geology. I regularly used various microscopy and microanalytical techniques and small particle analysis in my studies as a student and researcher in the geological and forensic sciences.

3. Since 2005, I have been Vice President and Senior Research Microscopist at Microtrace LLC. Microtrace is a forensic laboratory specializing in small particle analysis using microchemistry and microscopy. Microtrace is ISO 17025 accredited, which is a recognized industry standard held by forensic laboratories around the world. In my work at Microtrace, I regularly perform microscopy and other forensic analyses involving detailed imaging of small samples and features.

4. In recognition of my work and experience, I have been appointed to or have served on multiple standard-setting bodies related to forensic sciences and microscopy, including:

- ASTM International - Subcommittee on Interdisciplinary Forensic Science Standards
- North Carolina Forensic Science Advisory Board Member - advisor to North Carolina State Crime Laboratory
- National Institute of Standards and Technology - Materials (Trace) Subcommittee within the Chemistry/Instrumental Analysis Scientific Area Committee of the Organization of Scientific Area Committees for Forensic Science

5. As a forensic scientist and microscopist, I regularly utilize the following microscopical and trace-analysis techniques: macro-photography, stereomicroscopy, and scanning electron microscopy (collectively the "Imaging Techniques"). I have published in peer-reviewed publications, taught, and presented at industry conferences on topics utilizing these techniques.

These techniques have been applied in the forensic sciences for many years and are regularly used by practitioners in the field to create accurate, high-resolution images of very small objects. The equipment I use to perform the Imaging Techniques is regularly checked for accuracy, as appropriate. Macro-photography and stereomicroscopy accurately reproduce the color, texture, and shape of small objects and features. Scanning electron microscopy accurately reproduces the texture and shape of microscopic objects and features. In other words, all of these techniques accurately capture the appearance of the object being studied.

6. I have been retained by the Texas Chiropractic Association to generate images of acupuncture needles. As part of that work, I generated images of the following acupuncture needles (the “Subject Needles”):

- Seirin J15 Type, 0.16 x 15 mm
- Seirin J Type, 0.25 x. 30 mm
- Seirin J Type, 0.30 x 40 mm
- DBC Spring Singles, 0.18 x 15 mm
- DBC Spring Singles, 0.25 x 40 mm
- DBC Spring Singles, 0.30 x 50 mm
- Tai-Chi, 0.35 x 75 mm

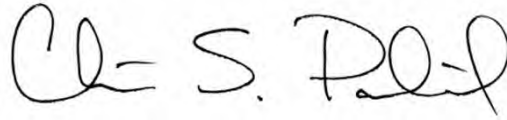
7. True and correct images of the Subject Needles are attached as **Exhibit 1** hereto. All images in Exhibit 1 were generated by me using one of the aforementioned Imaging Techniques which is specifically identified in the caption next to each image. The captions next to the images are also true and correct.

8. In some of the images in Exhibit 1, I included an inset showing an image of a human hair taken at the same magnification as the corresponding image of the needle. This comparison gives the viewer an intuitive way to understand the scale of the object being imaged.

9. A true and correct copy of my curriculum vitae is attached as **Exhibit 2** hereto.

I declare under penalty of perjury that the foregoing is true and correct.

Executed in Kane County, State of Illinois, on the date indicated below.

A handwritten signature in black ink, appearing to read "C. S. Palenik". The signature is written in a cursive, flowing style.

Christopher S. Palenik, Ph.D.
Vice President and Senior Research Microscopist
Microtrace LLC

27 May 2022
Date

EXHIBIT B-1



Figure 1. Tai Chi 0.35x75 mm needle packaging as documented by macro-photography on a copy stand.

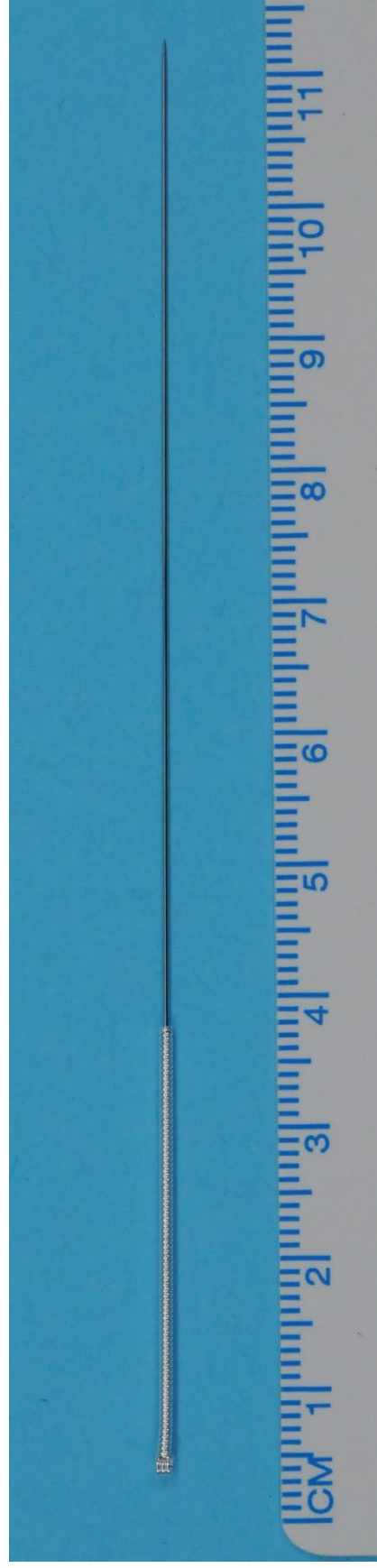


Figure 2. Tai Chi 0.35x75 mm needle as documented by macro-photography on a copy stand.

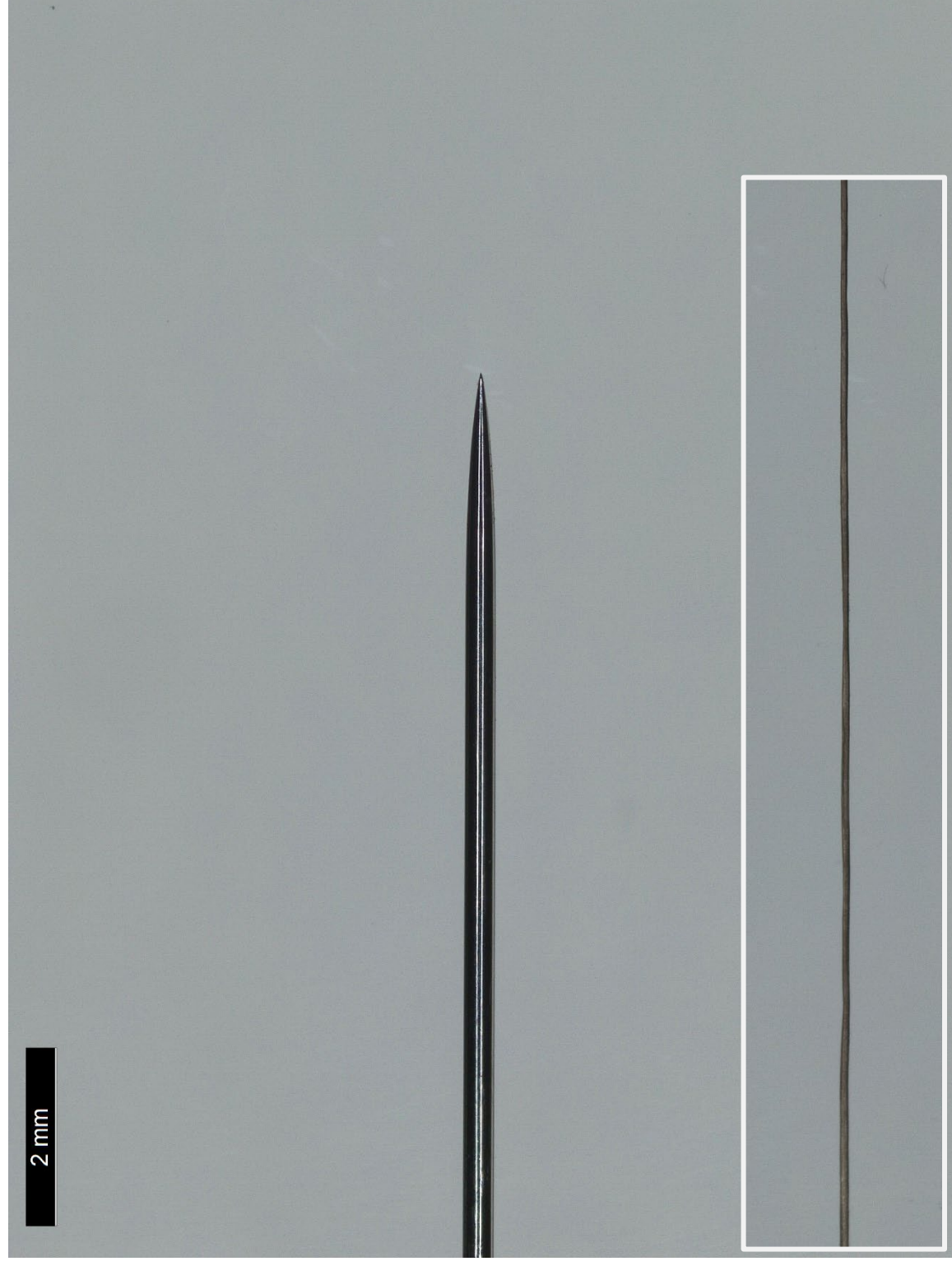


Figure 3. Tai Chi 0.35x75 mm individual needle as observed by stereomicroscopy. Inset shows a human head hair at the same magnification.

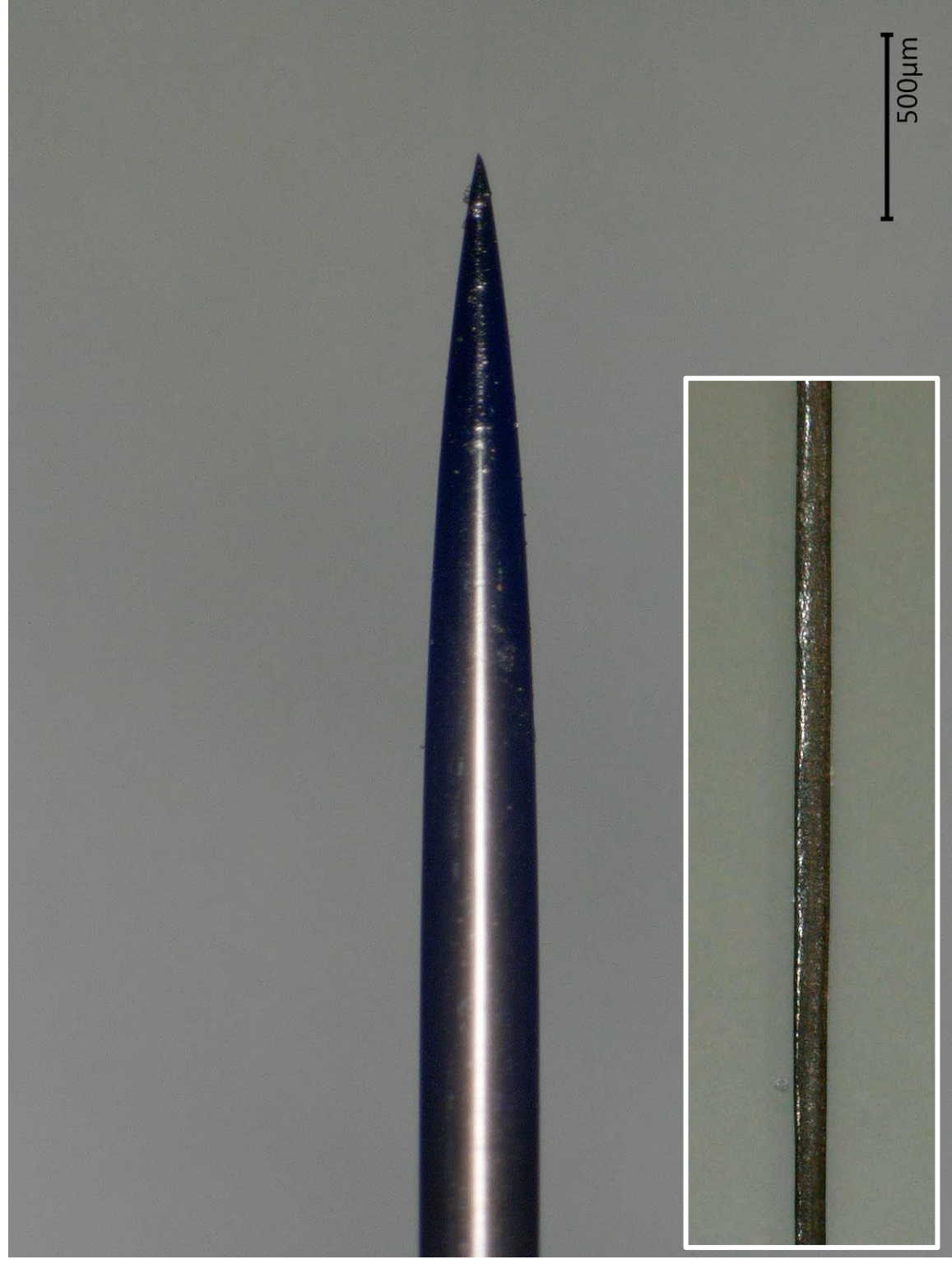


Figure 4. Tai Chi 0.35x75 mm individual needle tip as observed by stereomicroscopy. Inset shows a human head hair at the same magnification.

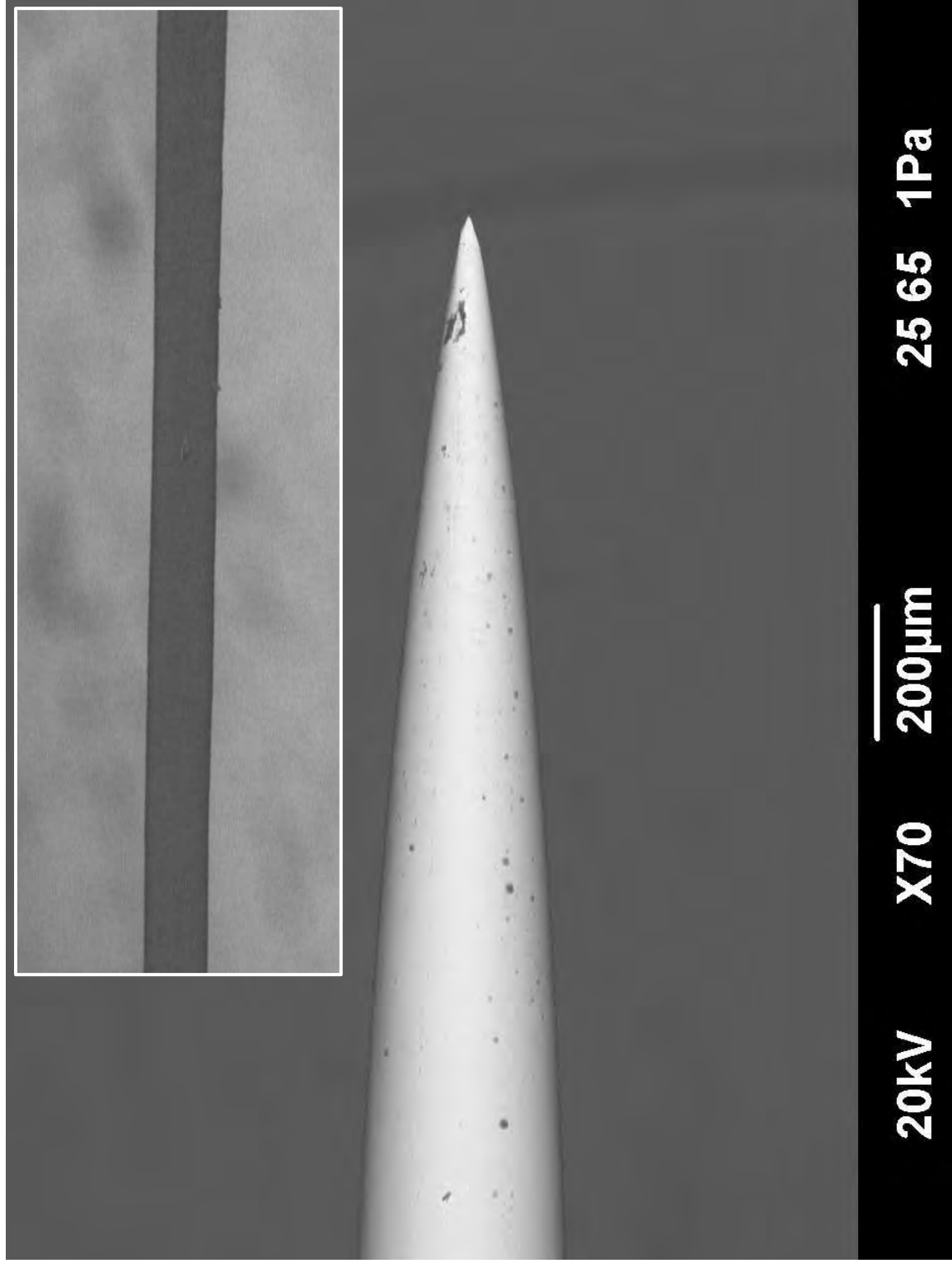


Figure 5. Tai Chi 0.35x75 mm individual needle tip as observed with backscatter imaging in a scanning electron microscope. Inset shows a human head hair at the same magnification.

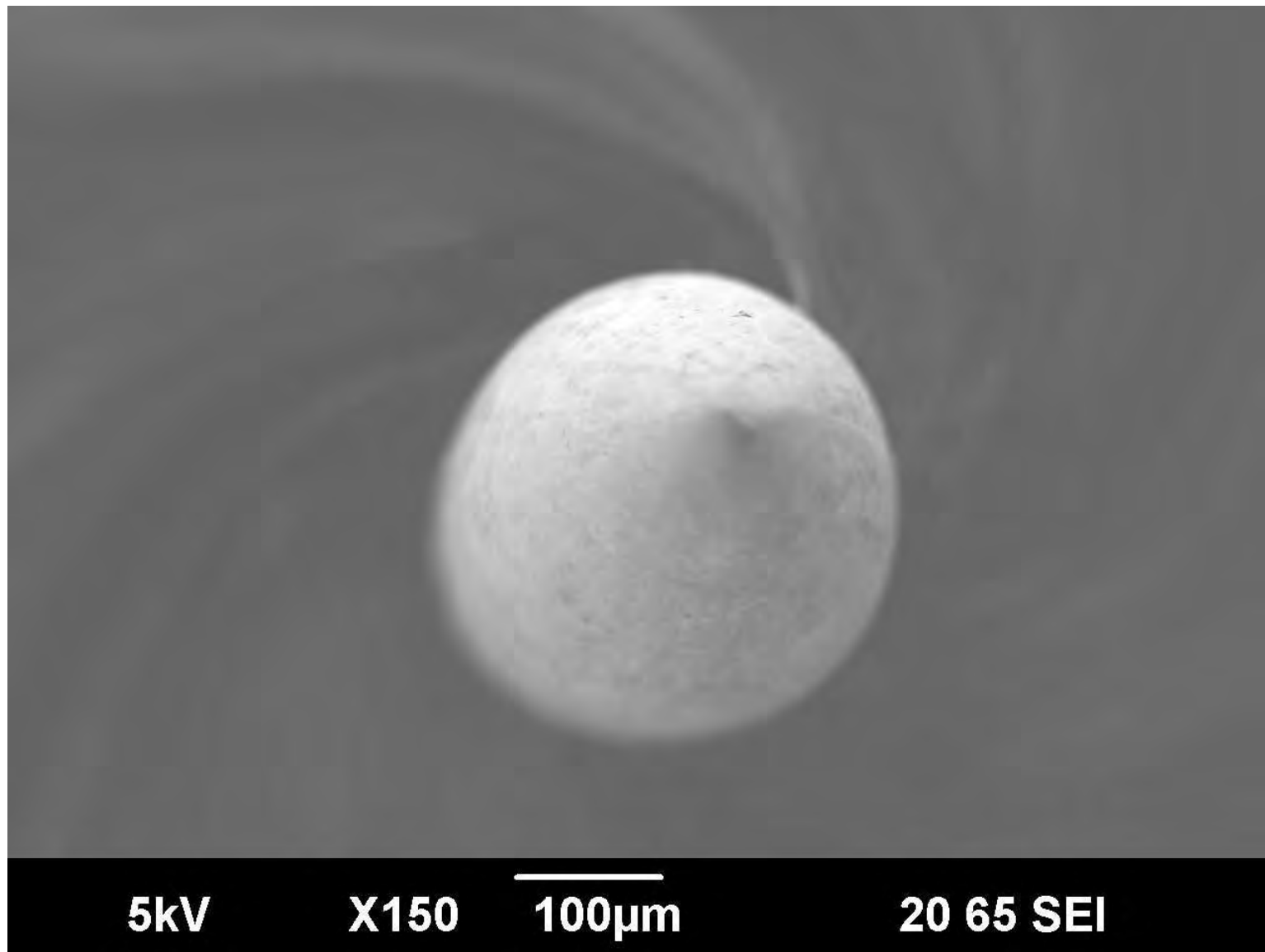


Figure 6. Tai Chi 0.35x75 mm individual needle tip as observed with secondary electron imaging in a scanning electron microscope. Image shows a smooth conical tip without a beveled edge.



Figure 7. Spring Singles DBC DB2 0.18 x 15 mm needle packaging as documented by macro-photography on a copy stand.

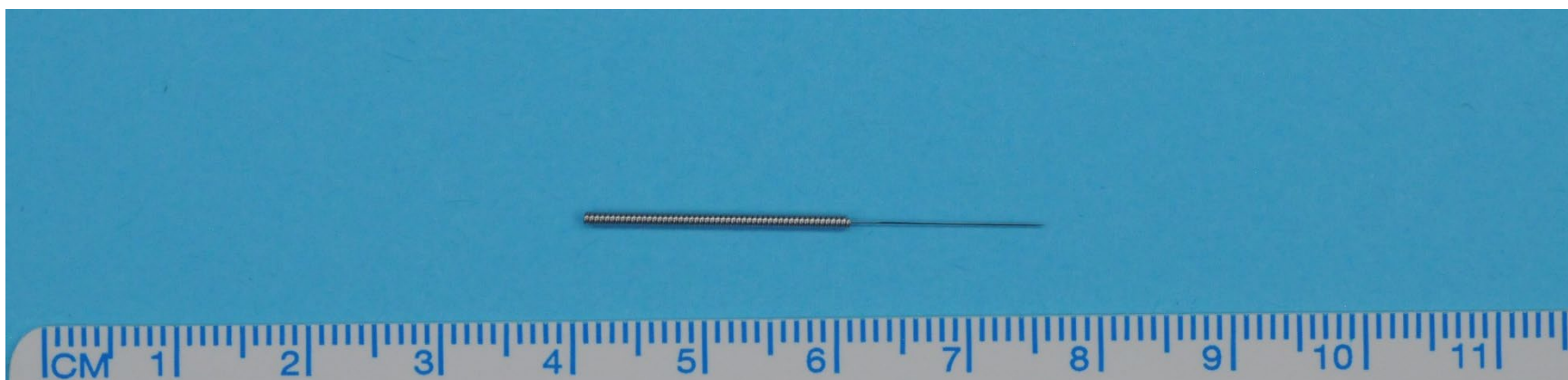


Figure 8. Spring Singles DBC DB2 0.18 x 15 mm needle as documented by macro-photography on a copy stand.

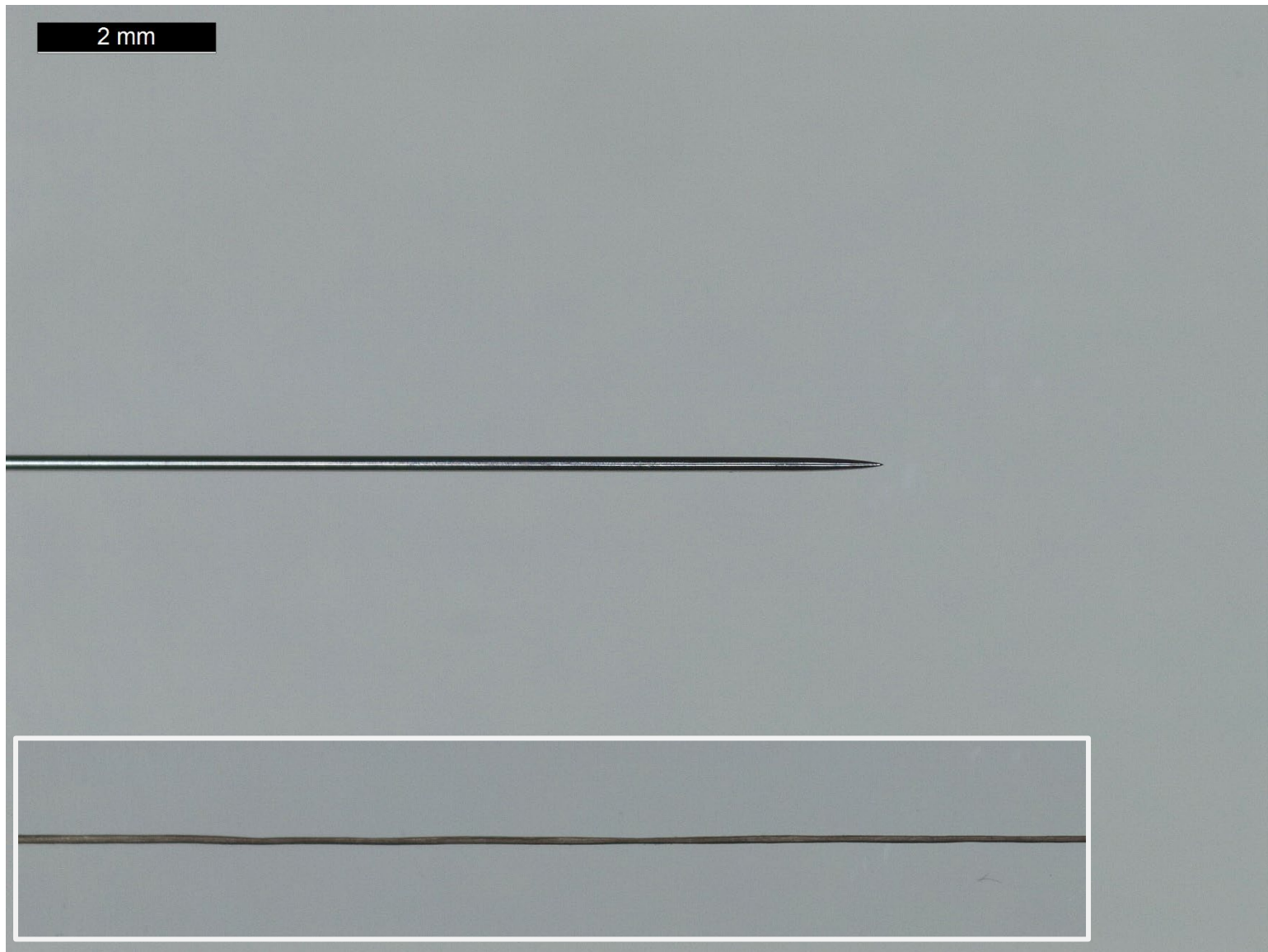


Figure 9. Spring Singles DBC DB2 0.18 x 15 mm individual needle as observed by stereomicroscopy. Inset shows a human head hair at the same magnification.

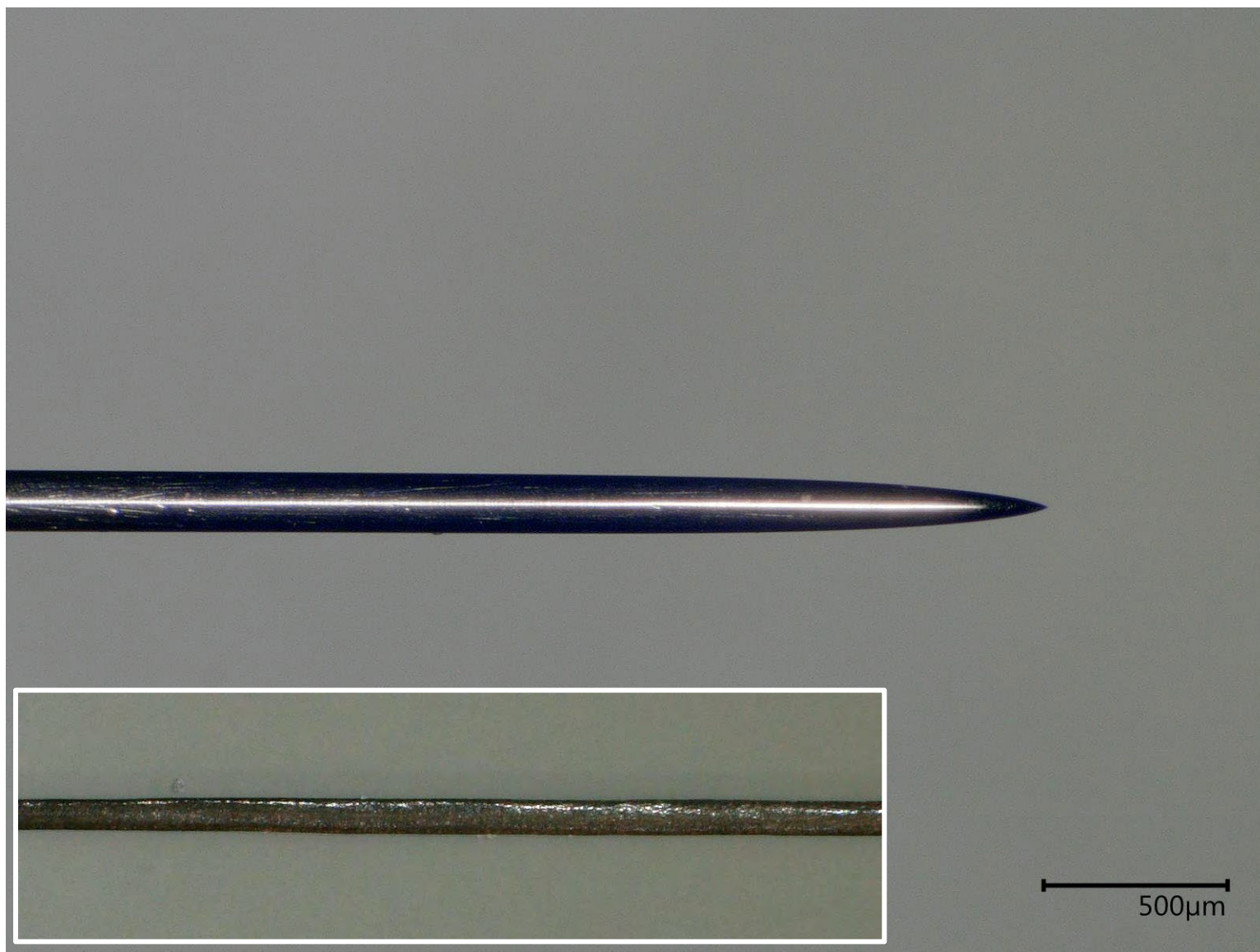


Figure 10. Spring Singles DBC DB2 0.18 x 15 mm individual needle tip as observed by stereomicroscopy. Inset shows a human head hair at the same magnification.

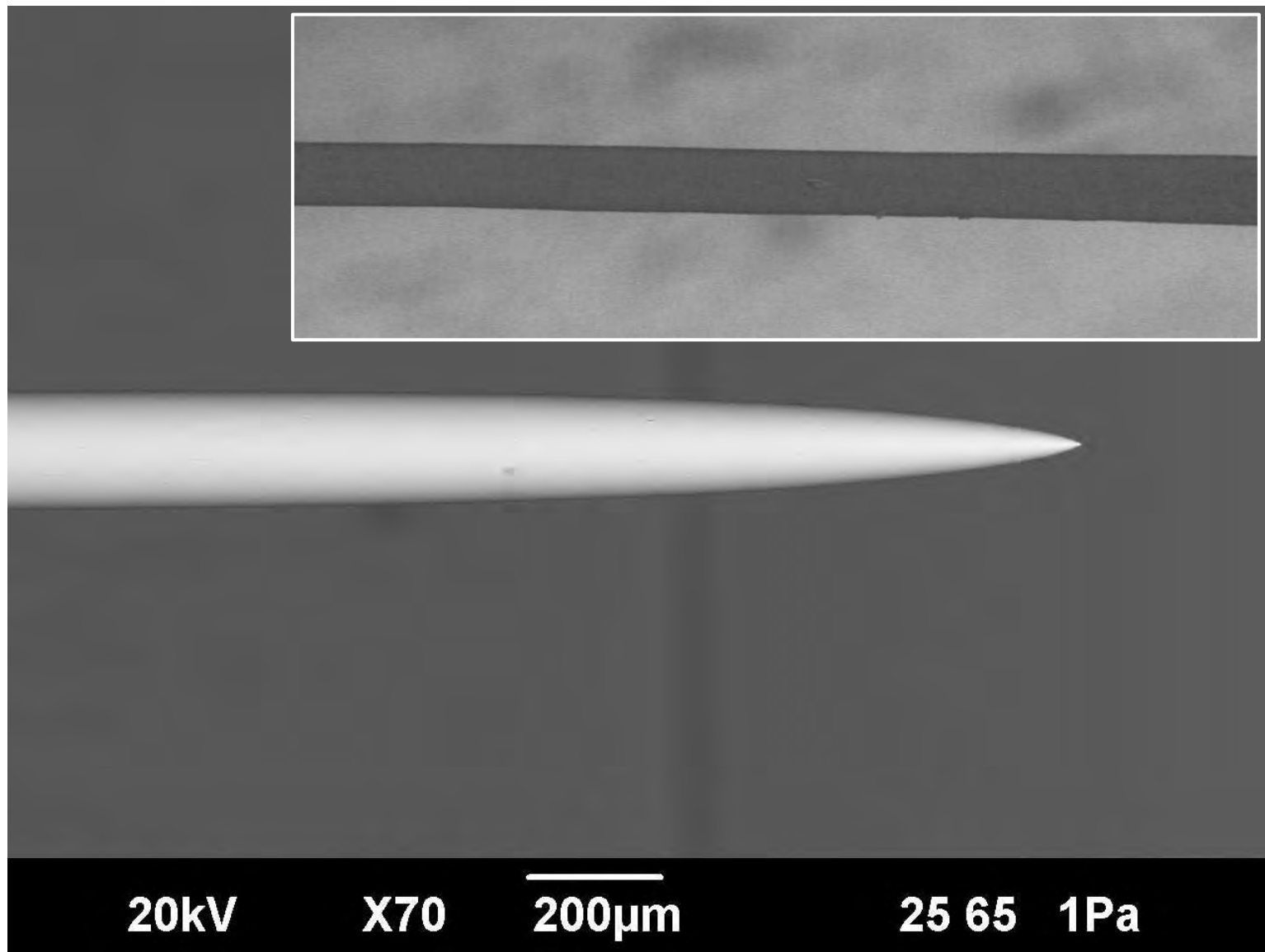


Figure 11. Spring Singles DBC DB2 0.18 x 15 mm individual needle tip as observed with backscatter imaging in a scanning electron microscope. Inset shows a human head hair at the same magnification.

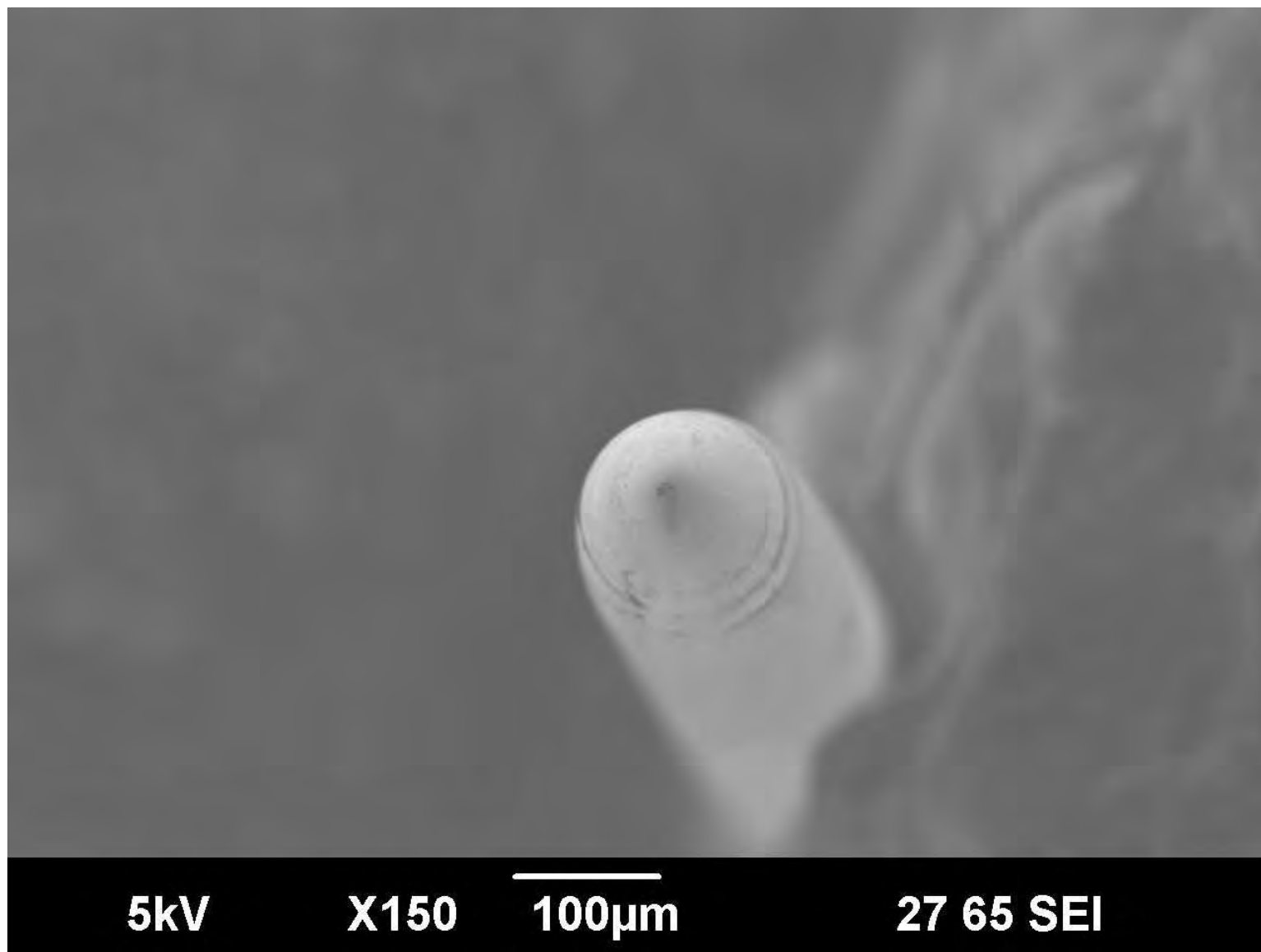


Figure 12. Spring Singles DBC DB2 0.18 x 15 mm individual needle tip as observed with secondary electron imaging in a scanning electron microscope. Image shows a smooth conical tip without a beveled edge.



Figure 13. Spring Singles DBC DB6 0.25 x 40 mm needle packaging as documented by macro-photography on a copy stand.

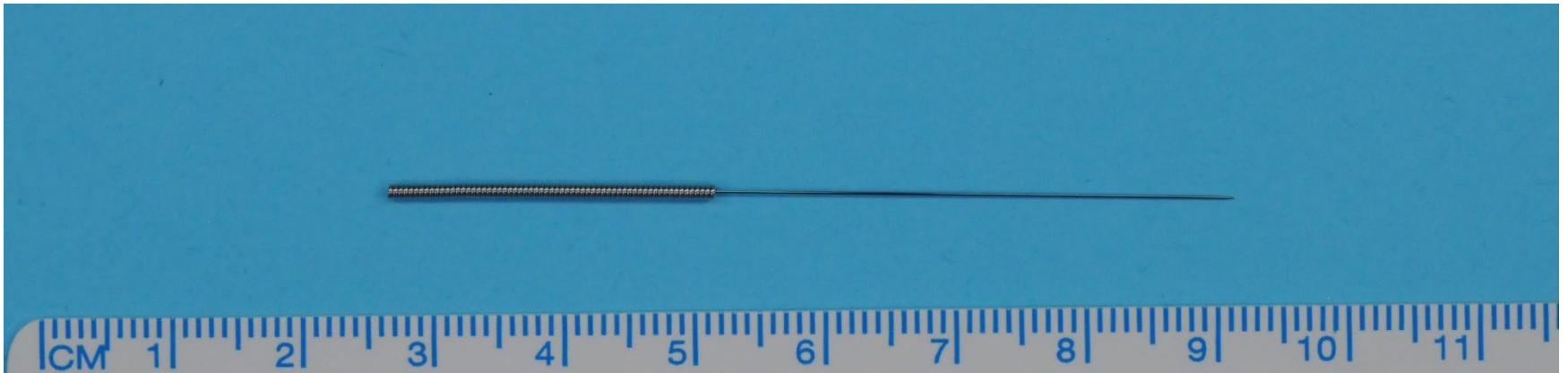


Figure 14. Spring Singles DBC DB6 0.25 x 40 mm needle as documented by macro-photography on a copy stand.

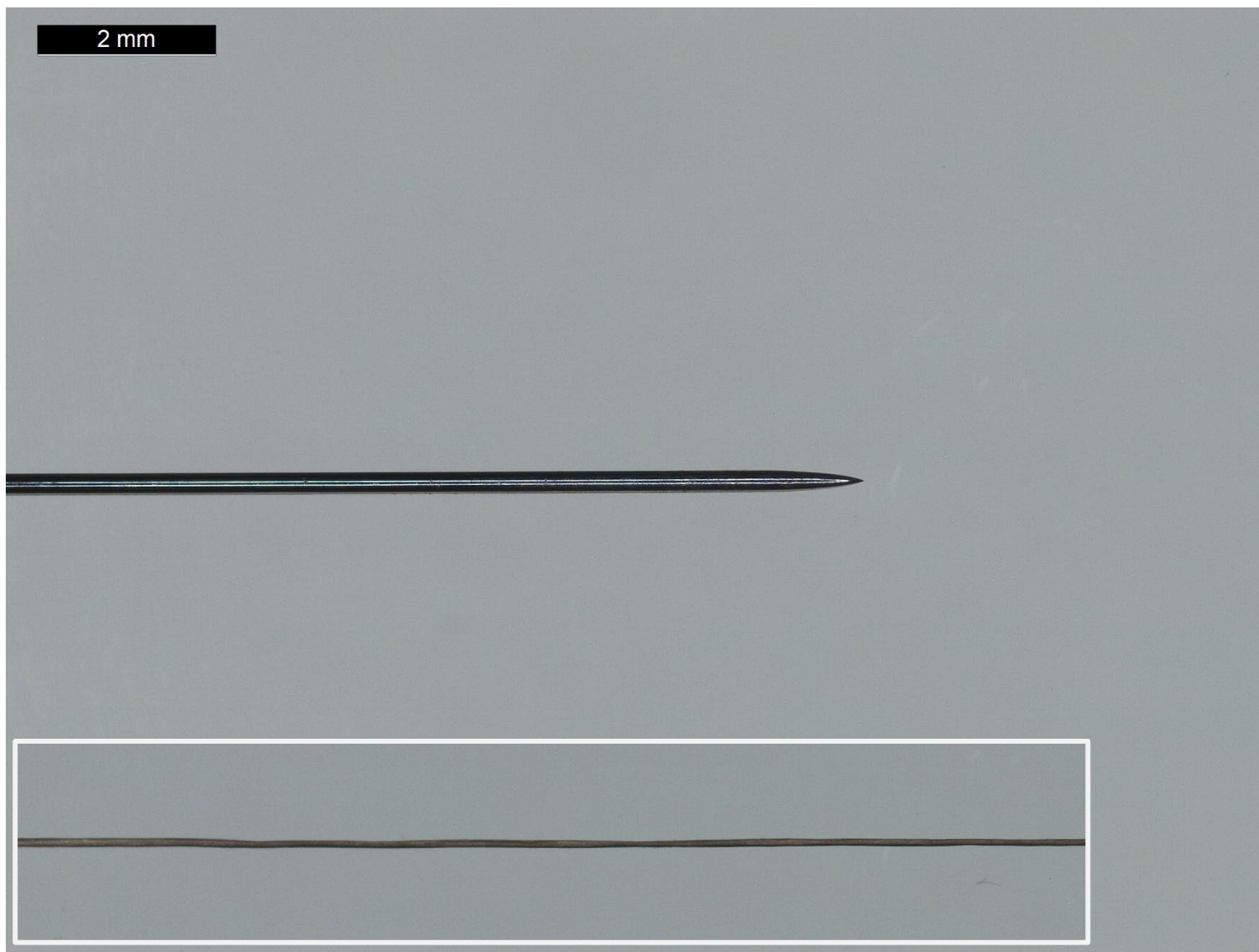


Figure 15. Spring Singles DBC DB6 0.25 x 40 mm individual needle as observed by stereomicroscopy. Inset shows a human head hair at the same magnification.

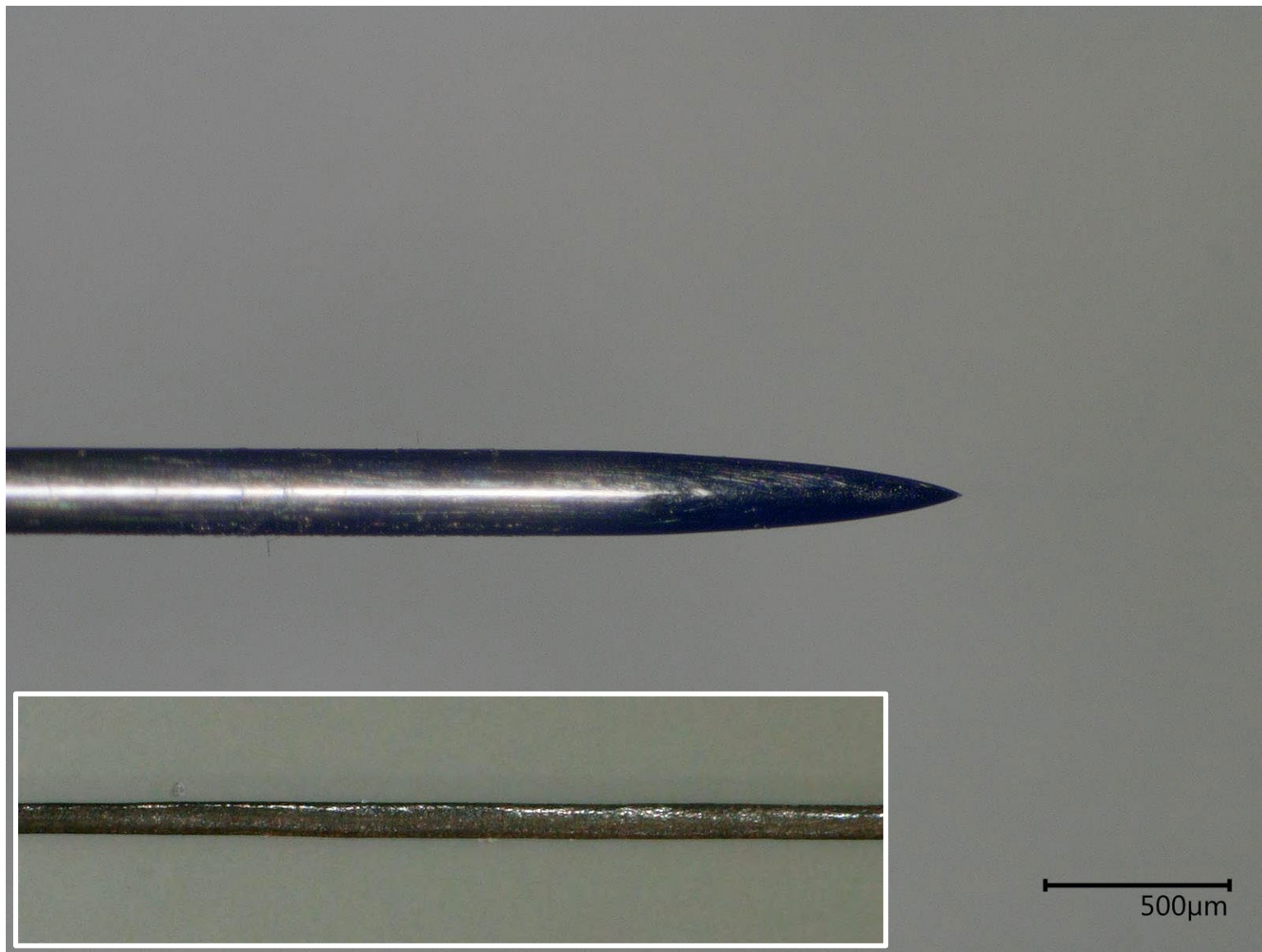


Figure 16. Spring Singles DBC DB6 0.25 x 40 mm individual needle tip as observed by stereomicroscopy. Inset shows a human head hair at the same magnification.

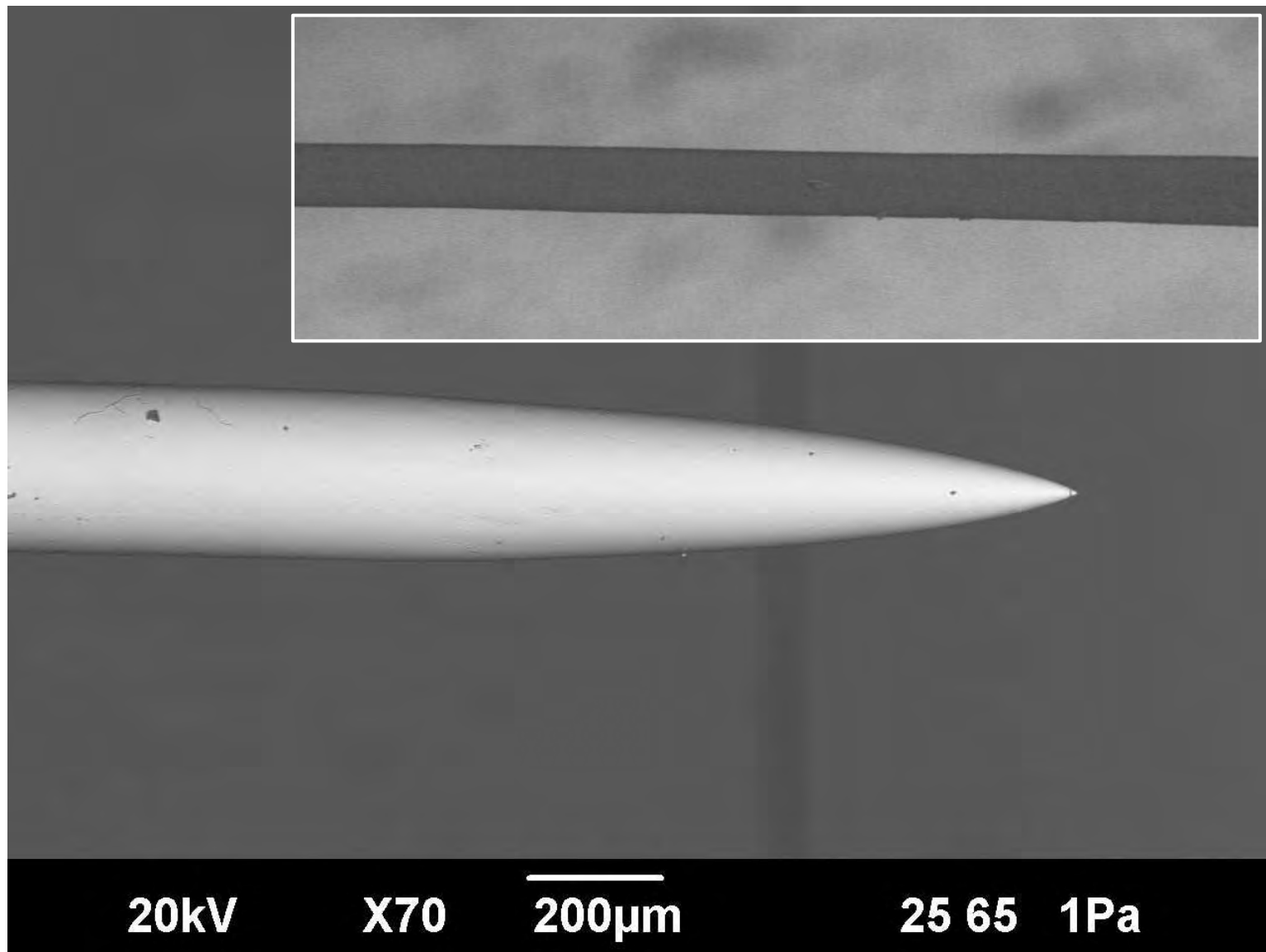


Figure 17. Spring Singles DBC DB6 0.25 x 40 mm individual needle tip as observed with backscatter imaging in a scanning electron microscope. Inset shows a human head hair at the same magnification.

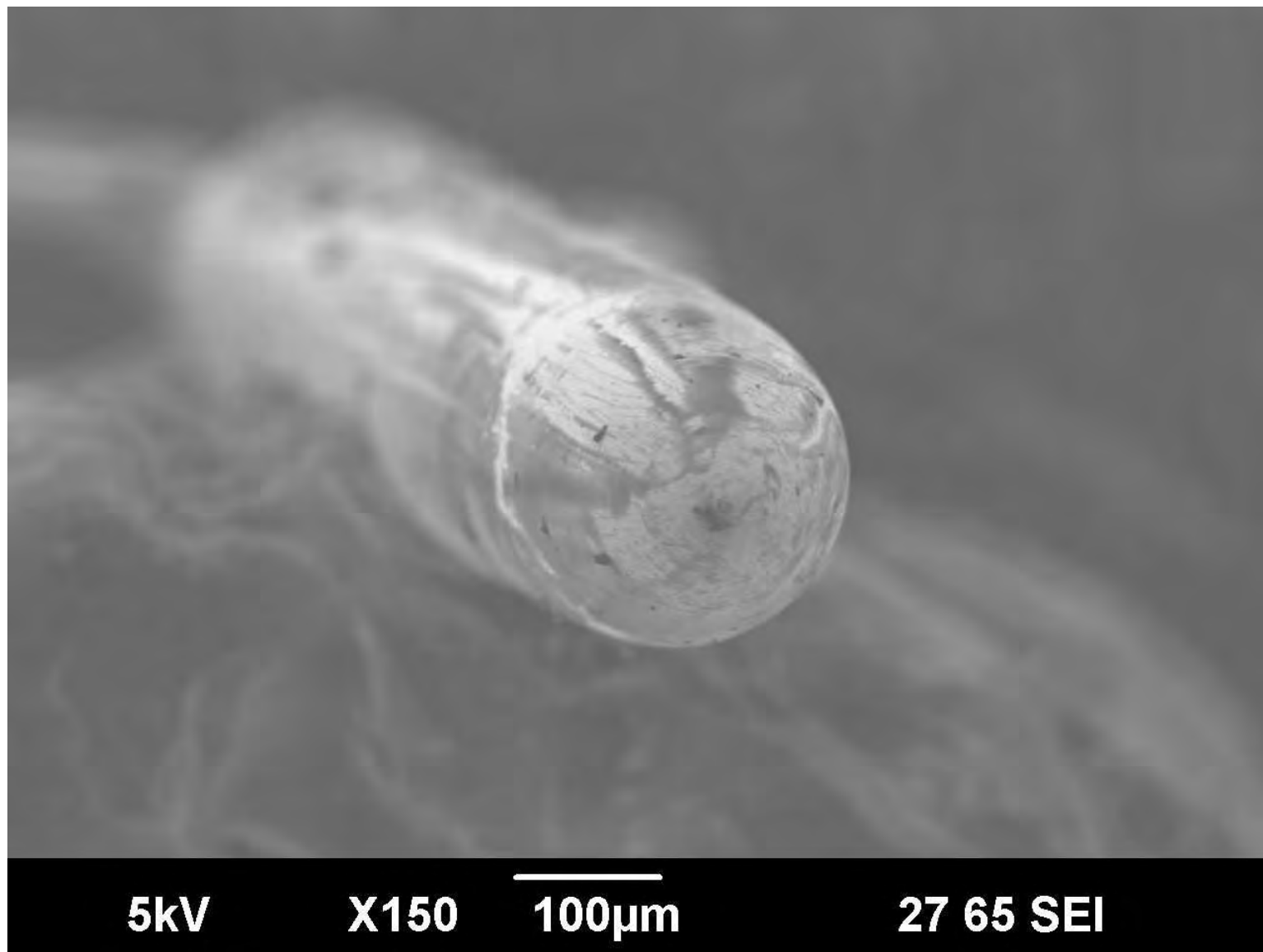


Figure 18. Spring Singles DBC DB6 0.25 x 40 mm individual needle tip as observed with secondary electron imaging in a scanning electron microscope. Image shows a smooth conical tip without a beveled edge.



Figure 19. Spring Singles DBC DB9 0.30 x 50 mm needle packaging as documented by macro-photography on a copy stand.

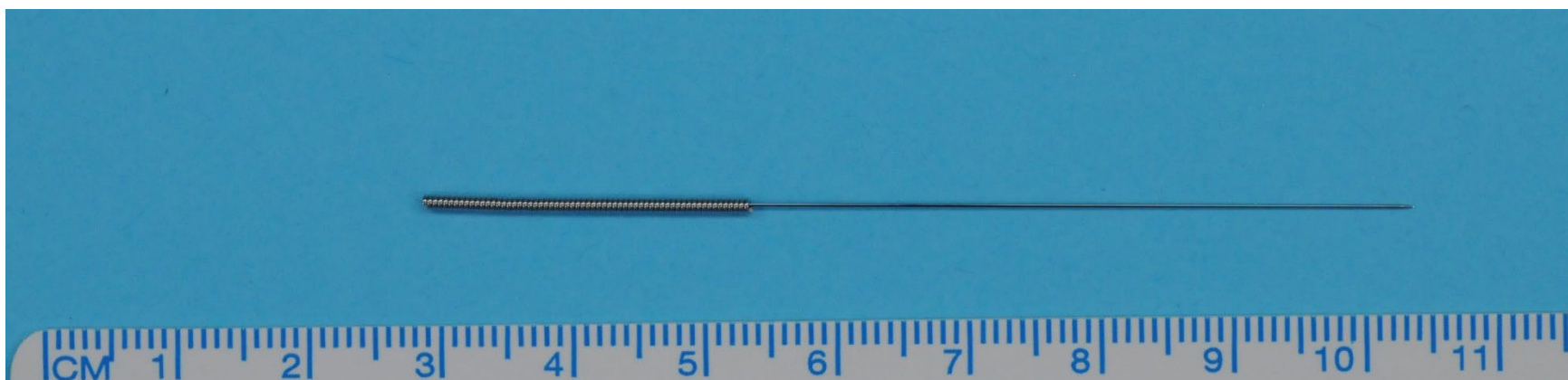


Figure 20. Spring Singles DBC DB9 0.30 x 50 mm needle as documented by macro-photography on a copy stand.

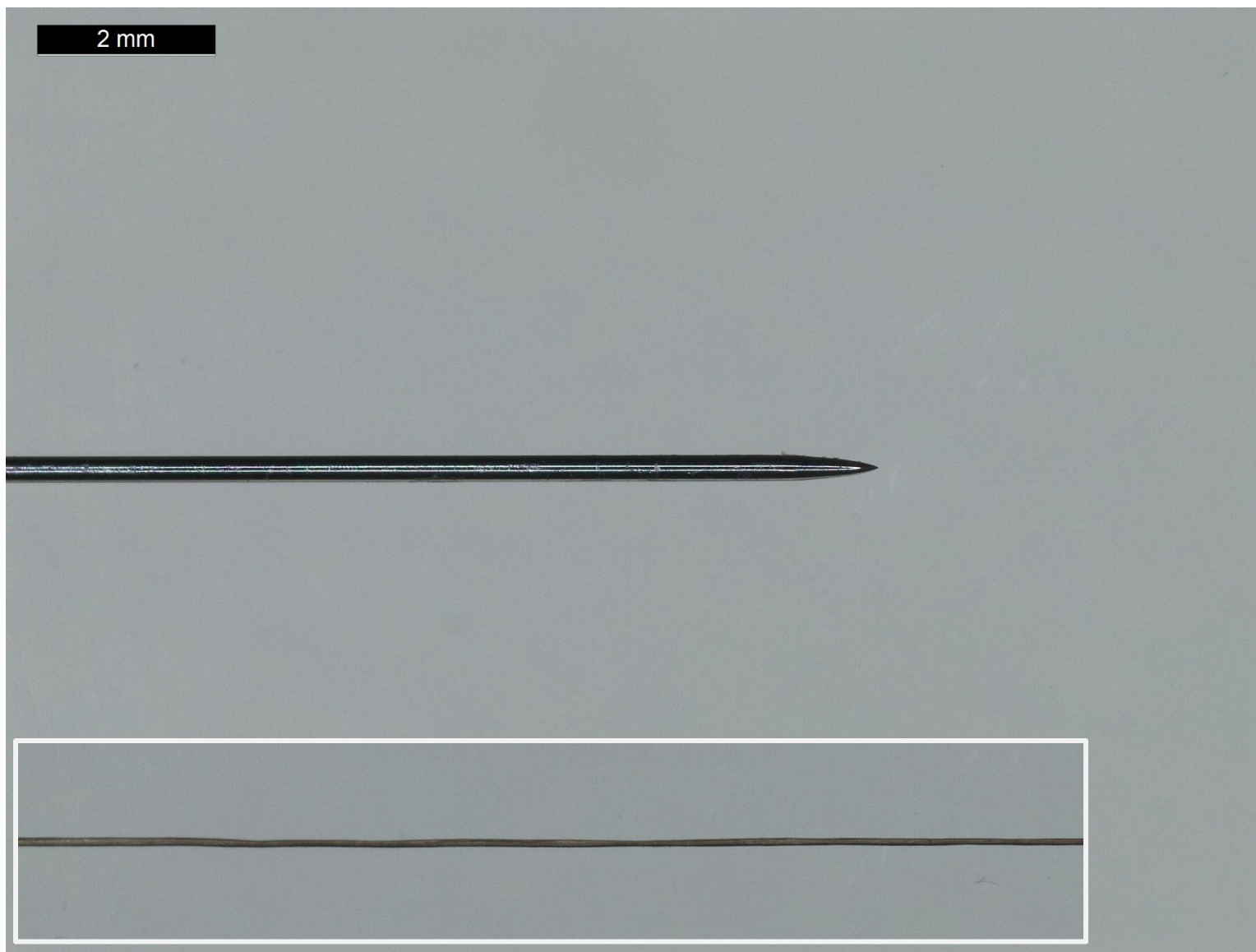


Figure 21. Spring Singles DBC DB9 0.30 x 50 mm individual needle as observed by stereomicroscopy. Inset shows a human head hair at the same magnification.

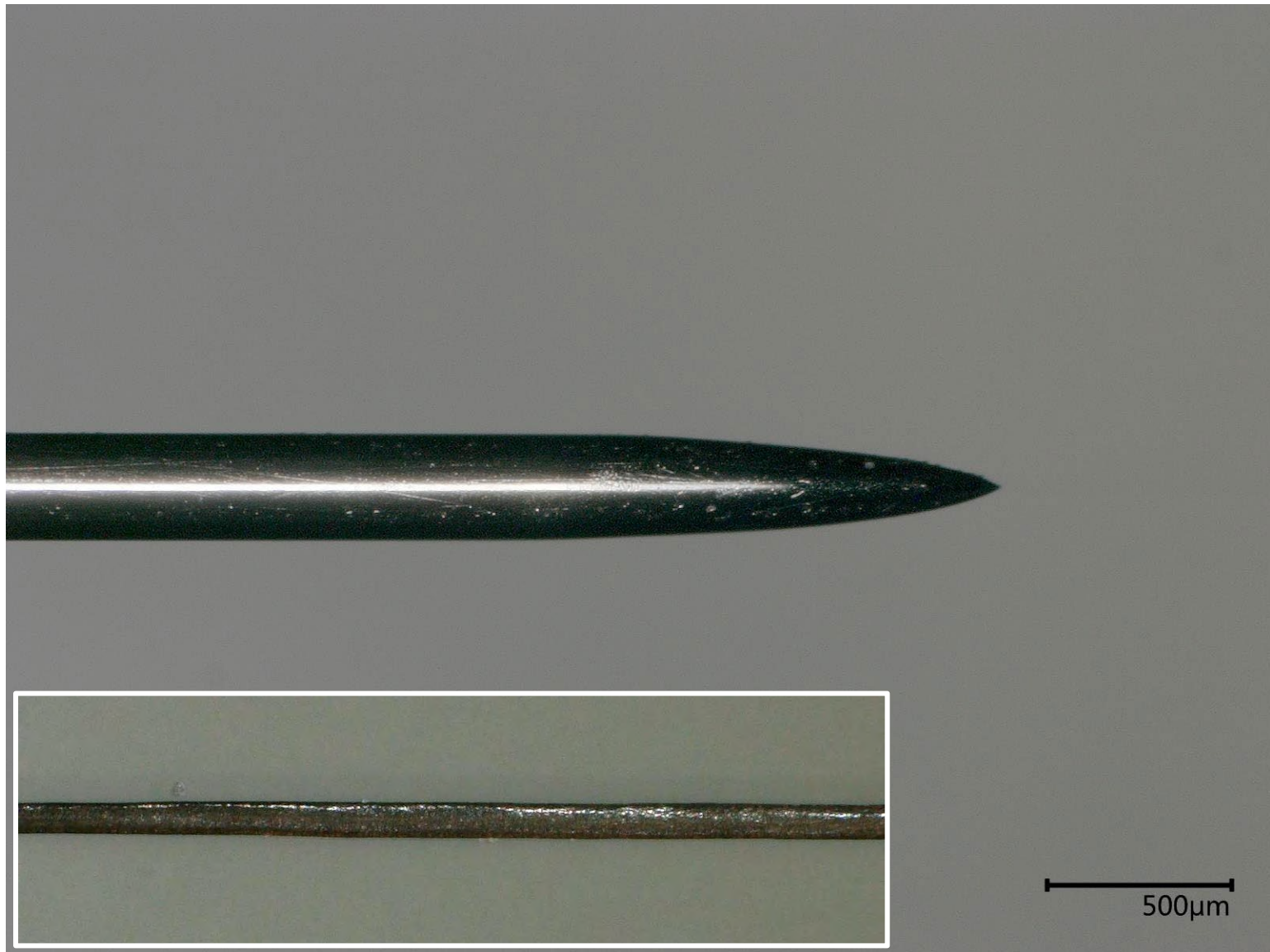


Figure 22. Spring Singles DBC DB9 0.30 x 50 mm individual needle tip as observed by stereomicroscopy. Inset shows a human head hair at the same magnification.

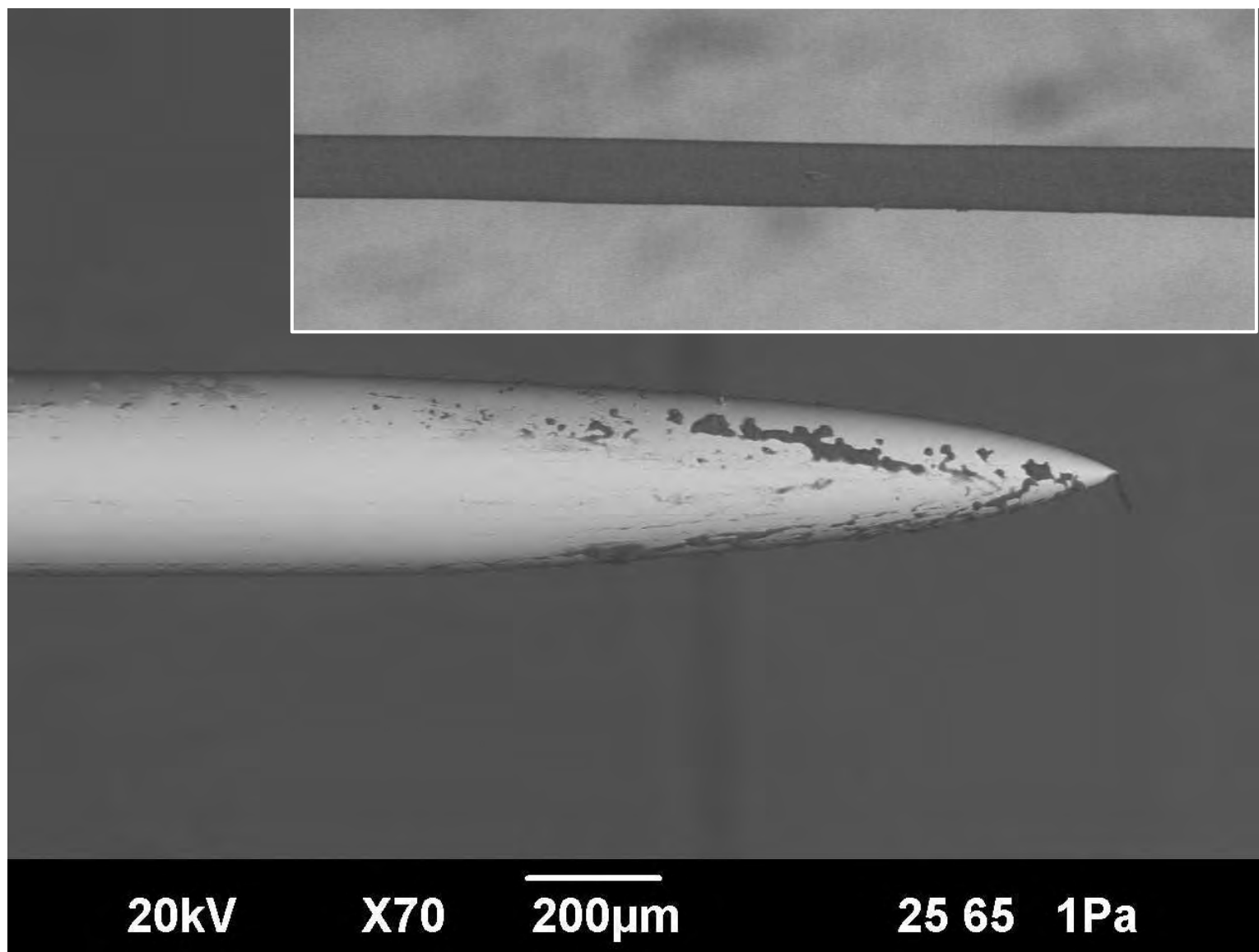


Figure 23. Spring Singles DBC DB9 0.30 x 50 mm individual needle tip as observed with backscatter imaging in a scanning electron microscope. Inset shows a human head hair at the same magnification.

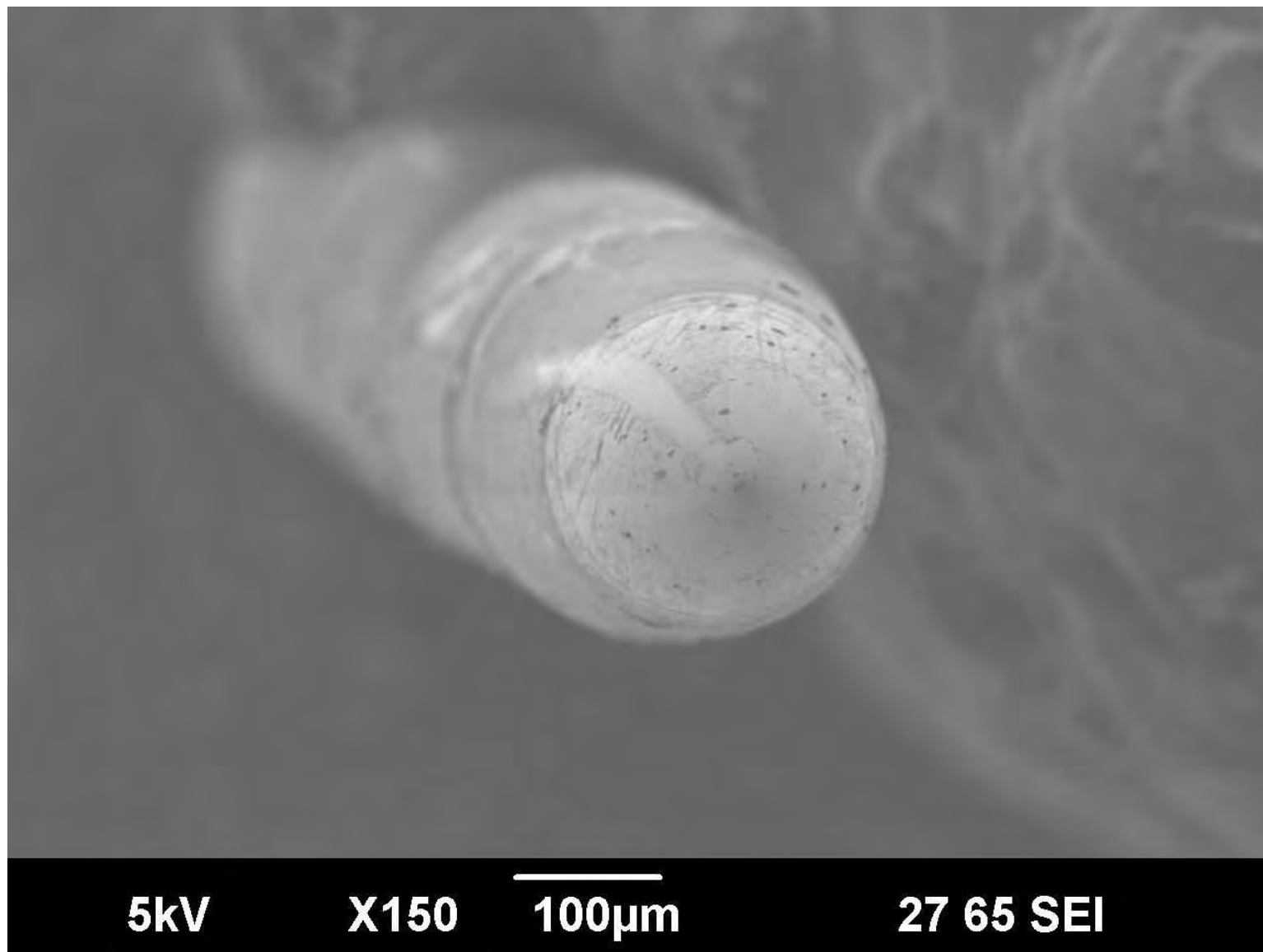


Figure 24. Spring Singles DBC DB9 0.30 x 50 mm individual needle tip as observed with secondary electron imaging in a scanning electron microscope. Image shows a smooth conical tip without a beveled edge.



Figure 25. Seirin J15 Type No. 1 0.16 x 15 mm needle packaging as documented by macro-photography on a copy stand.

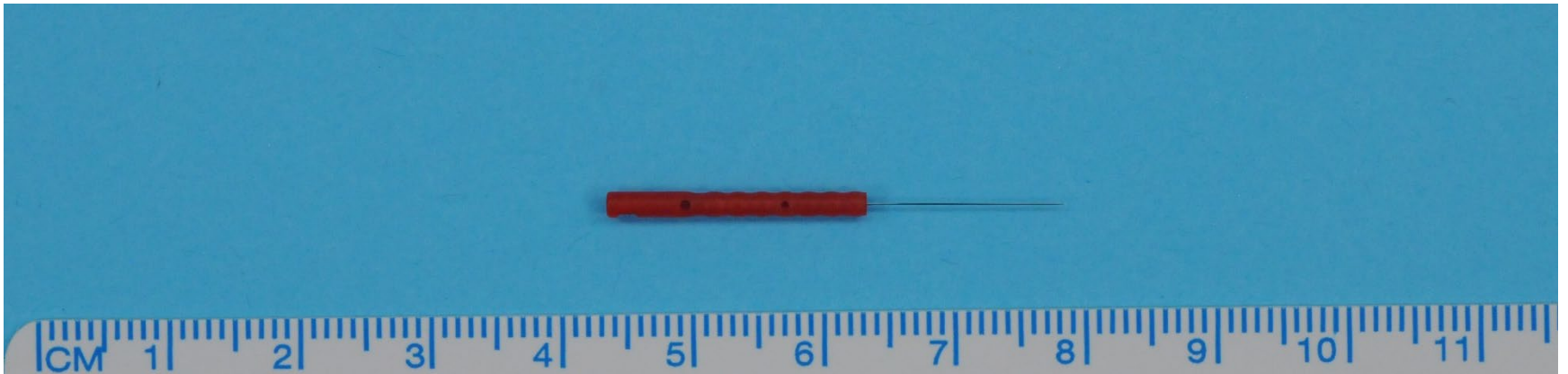


Figure 26. Seirin J15 Type No. 1 0.16 x 15 mm needle as documented by macro-photography on a copy stand.

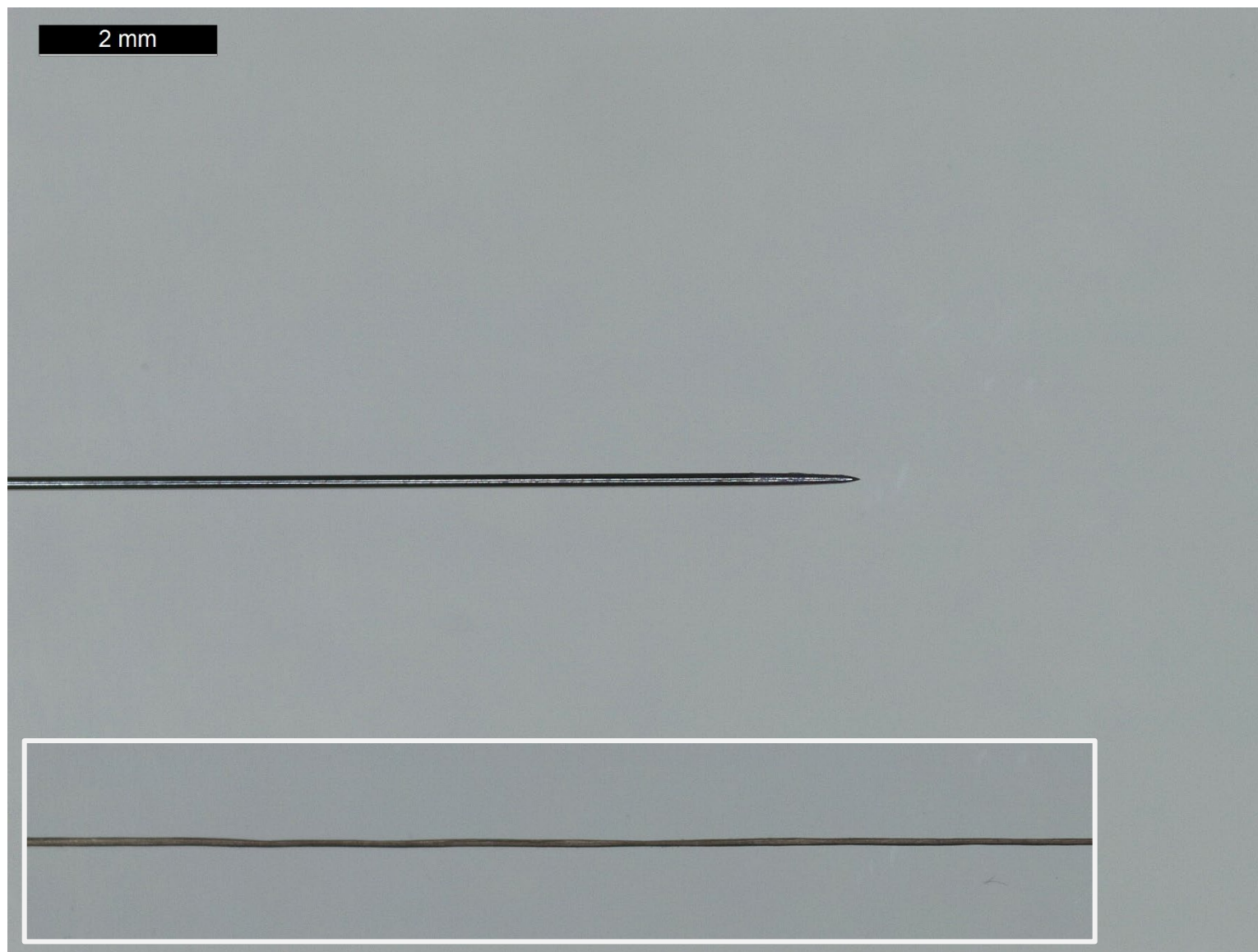


Figure 27. Seirin J15 Type No. 1 0.16 x 15 mm individual needle as observed by stereomicroscopy. Inset shows a human head hair at the same magnification.

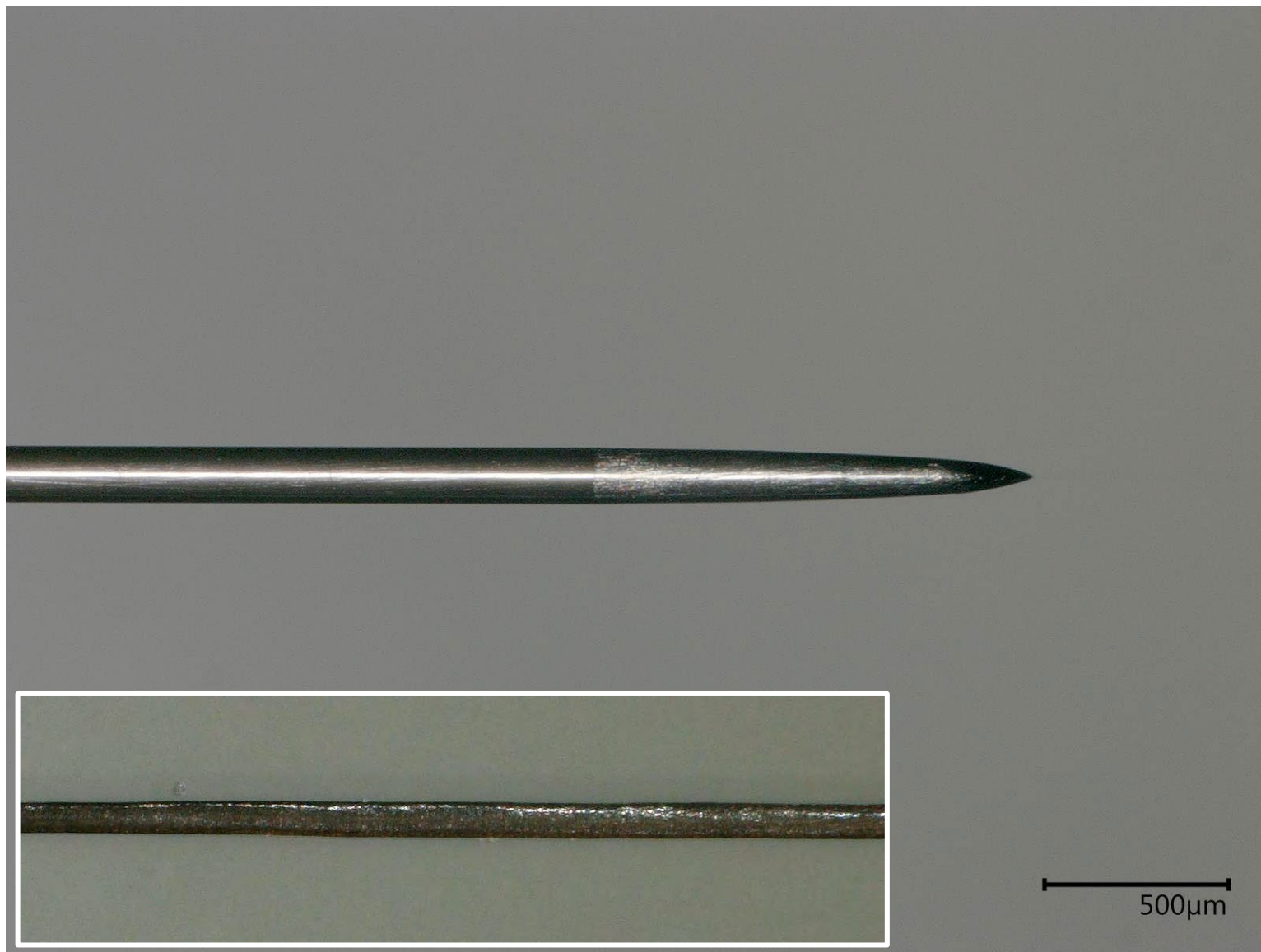


Figure 28. Seirin J15 Type No. 1 0.16 x 15 mm individual needle tip as observed by stereomicroscopy. Inset shows a human head hair at the same magnification.

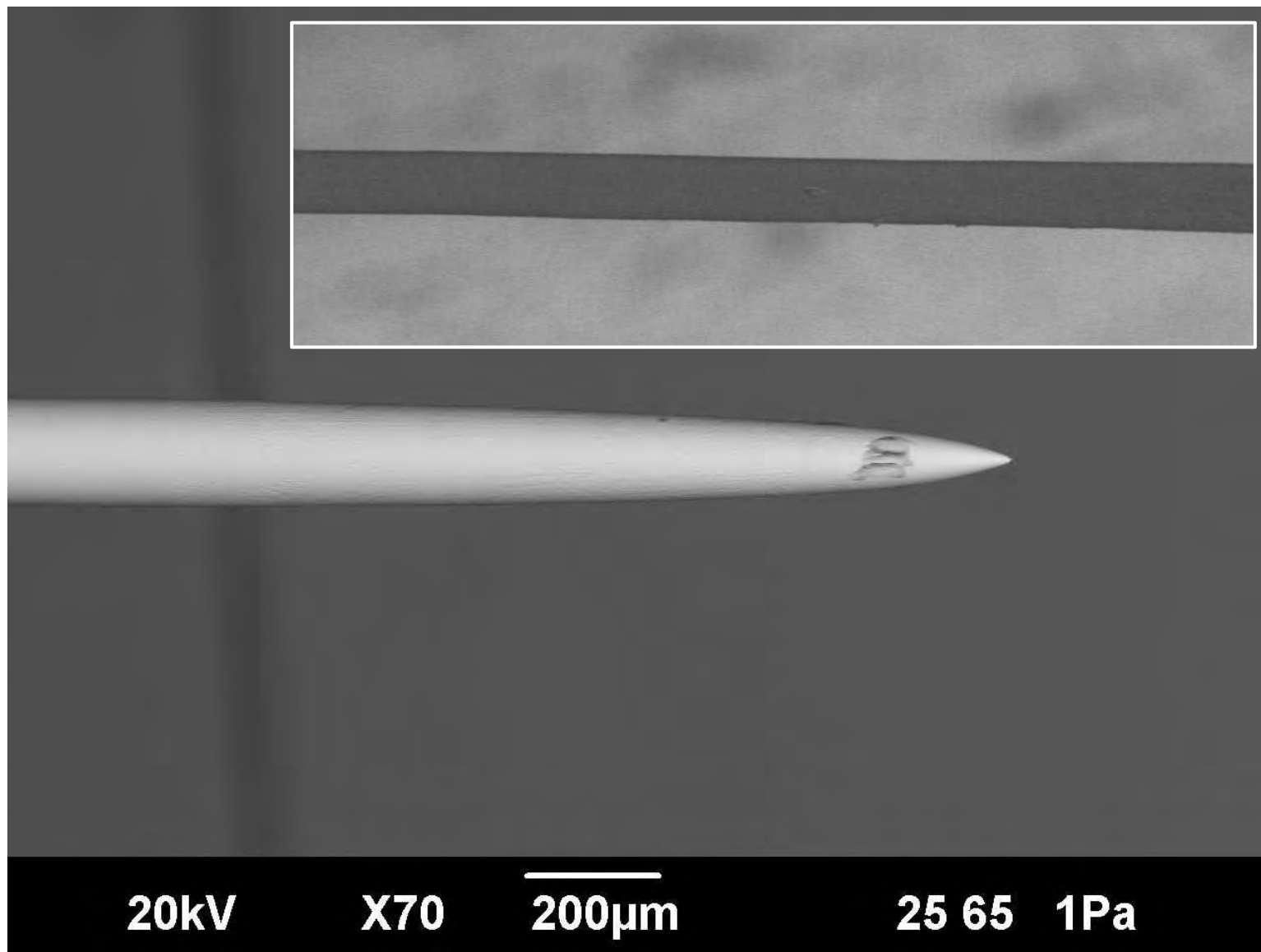


Figure 29. Seirin J15 Type No. 1 0.16 x 15 mm individual needle tip as observed with backscatter imaging in a scanning electron microscope. Inset shows a human head hair at the same magnification.



Figure 30. Seirin J15 Type No. 1 0.16 x 15 mm individual needle tip as observed with secondary electron imaging in a scanning electron microscope. Image shows a smooth conical tip without a beveled edge.



Figure 31. Seirin J Type No. 5 0.25 x 30 mm needle packaging as documented by macro-photography on a copy stand.

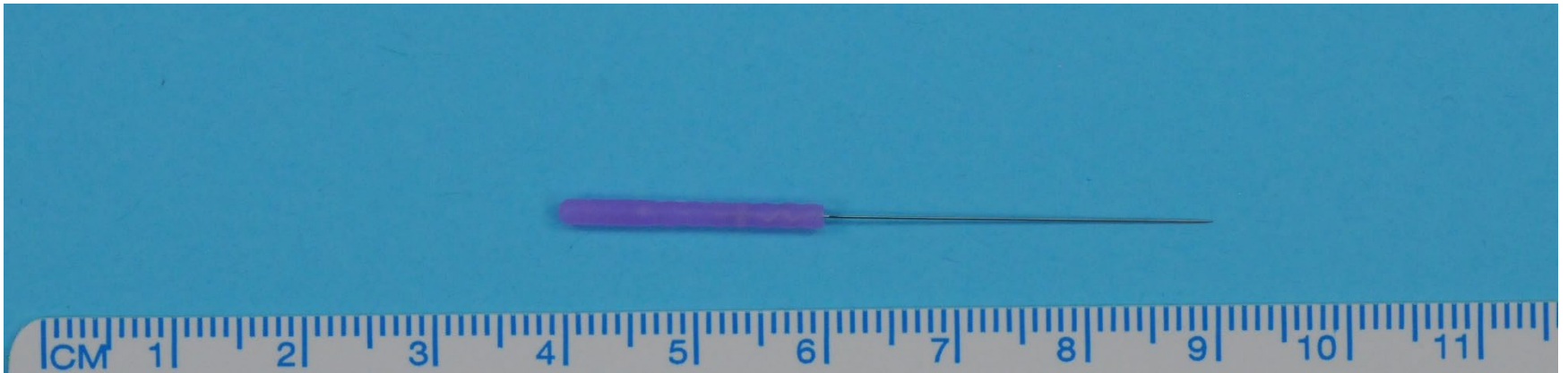


Figure 32. Seirin J Type No. 5 0.25 x 30 mm needle as documented by macro-photography on a copy stand.

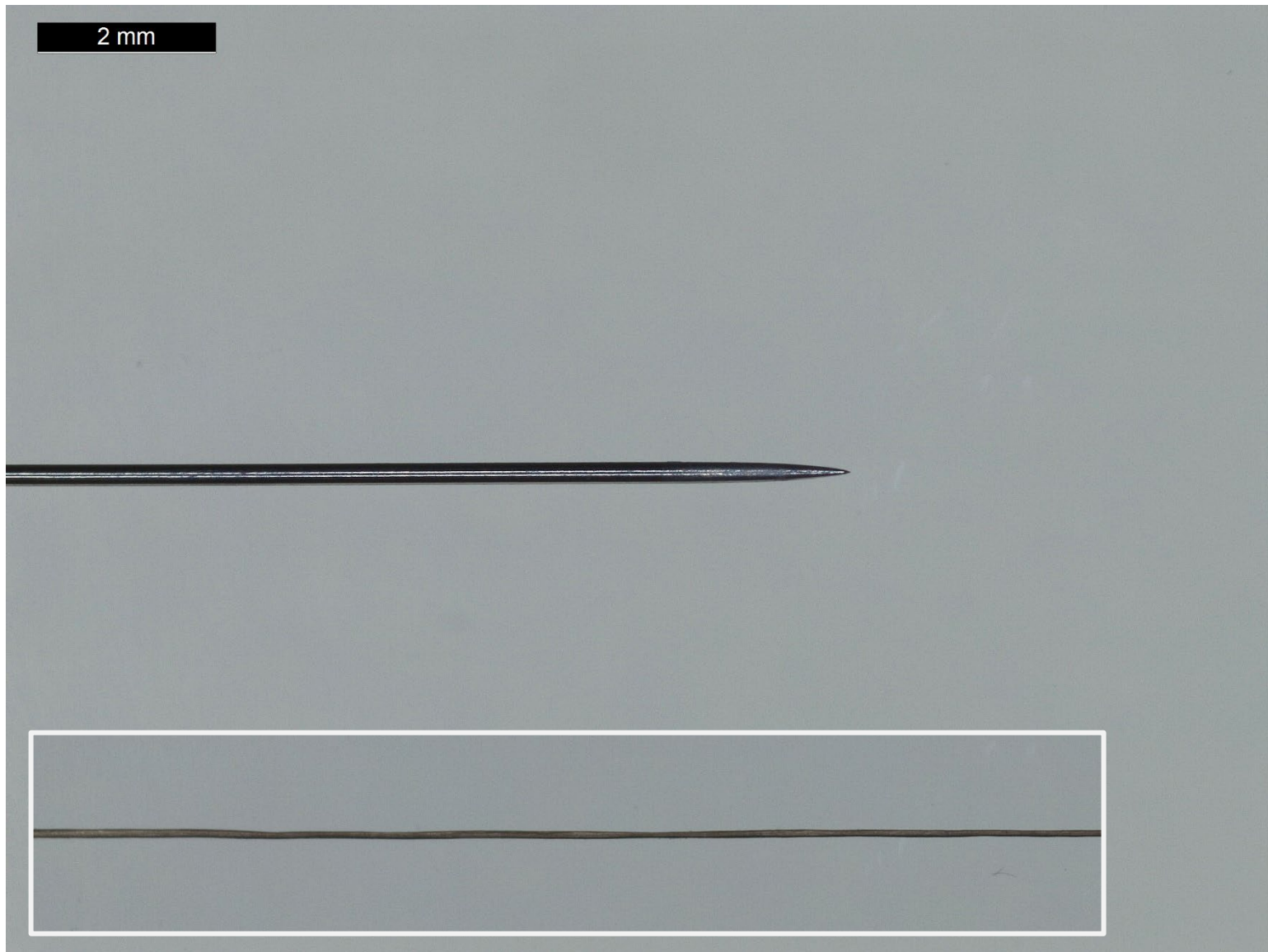


Figure 33. Seirin J Type No. 5 0.25 x 30 mm individual needle as observed by stereomicroscopy. Inset shows a human head hair at the same magnification.

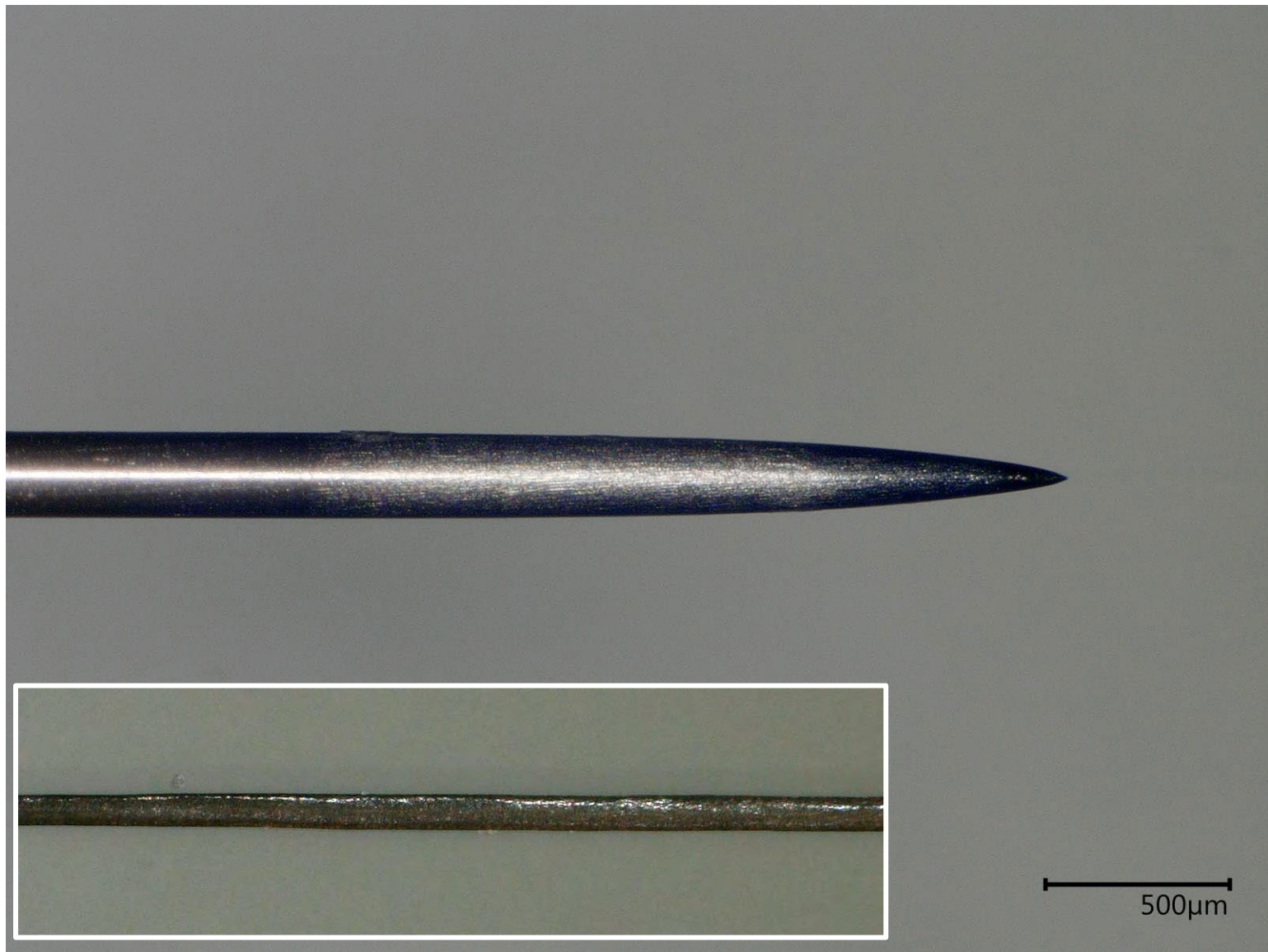


Figure 34. Seirin J Type No. 5 0.25 x 30 mm needle tip individual needle tip as observed by stereomicroscopy. Inset shows a human head hair at the same magnification.

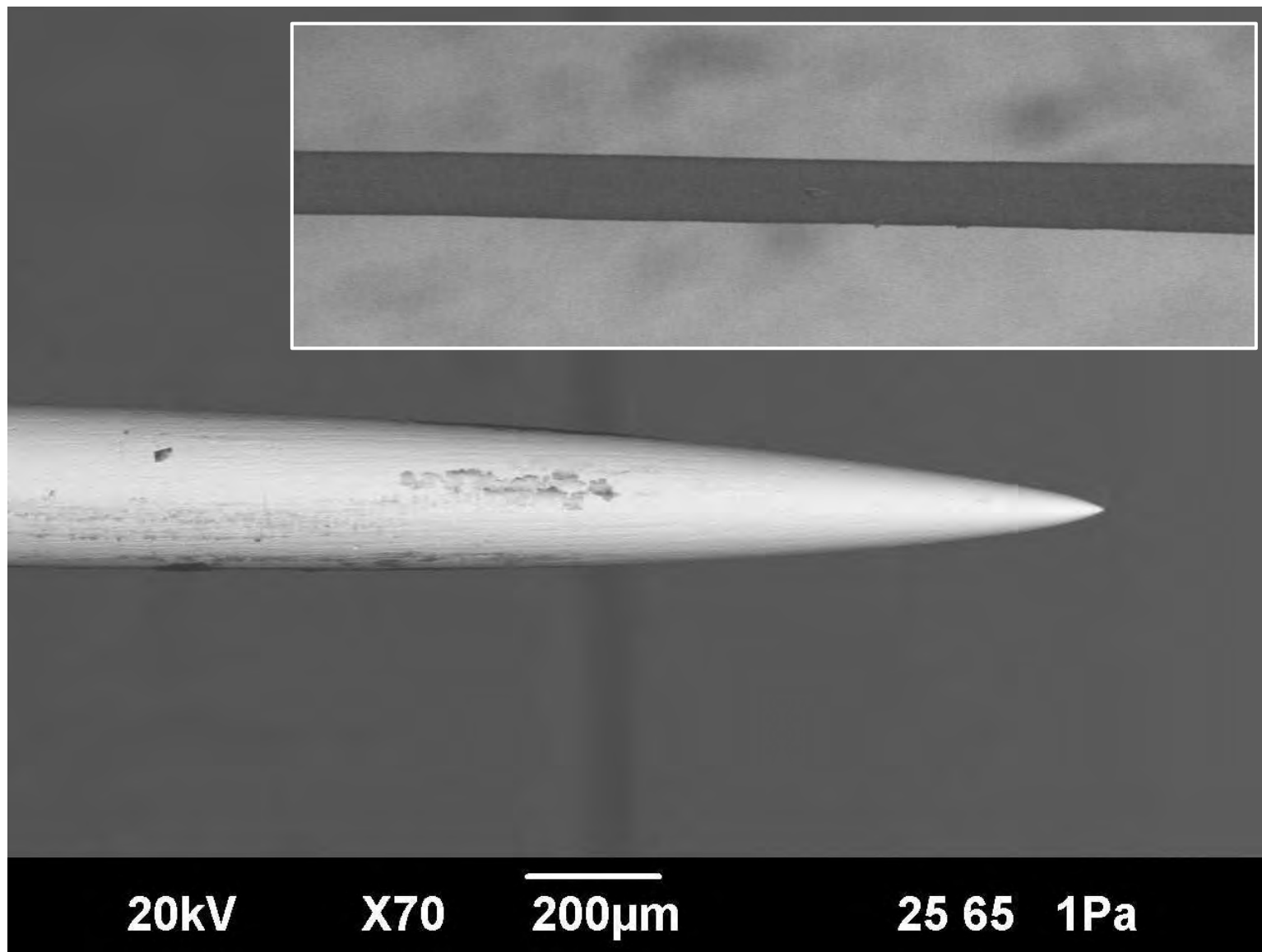


Figure 35. Seirin J Type No. 5 0.25 x 30 mm individual needle tip as observed with backscatter imaging in a scanning electron microscope. Inset shows a human head hair at the same magnification.

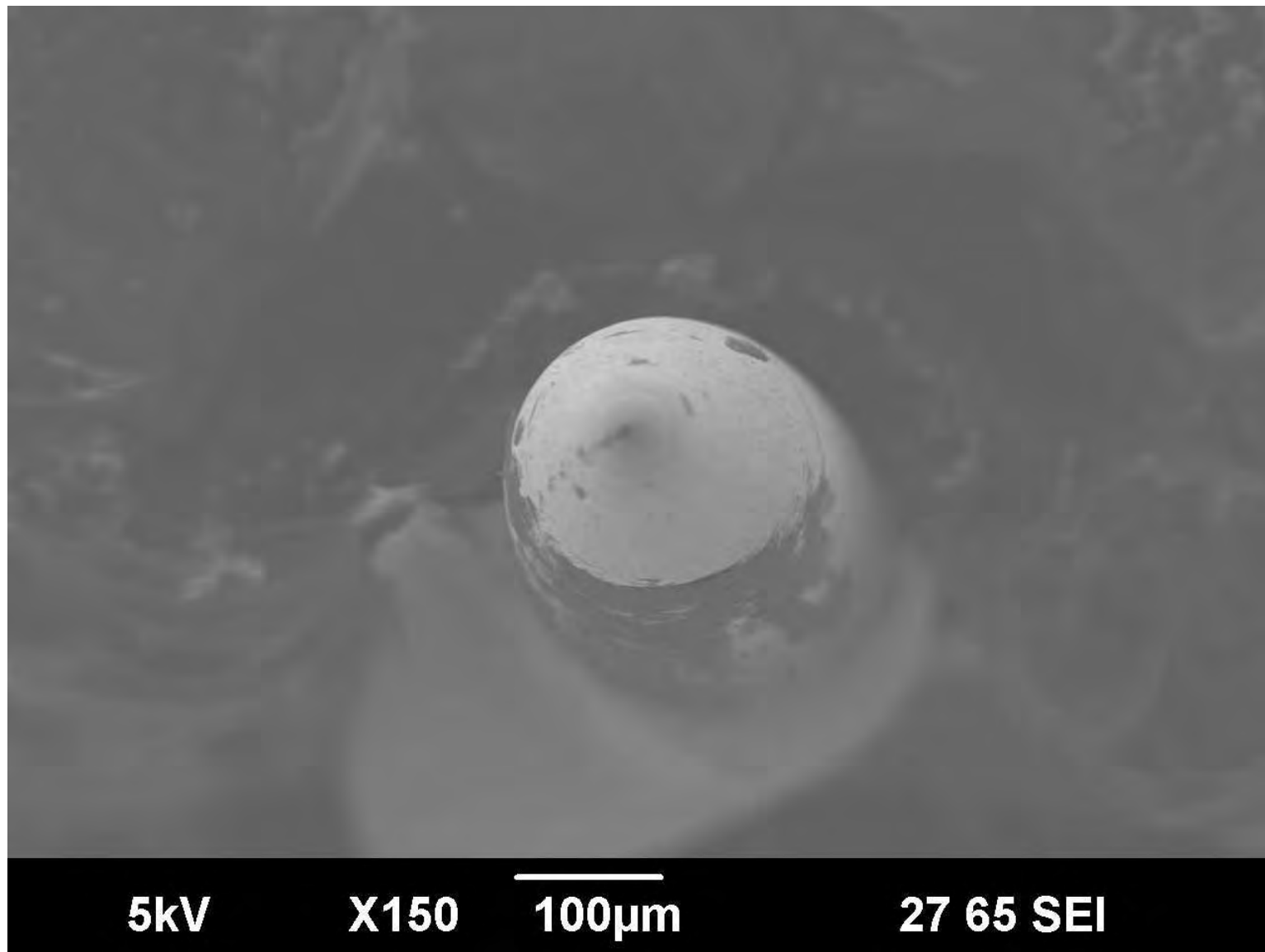


Figure 36. Seirin J Type No. 5 0.25 x 30 mm individual needle tip as observed with secondary electron imaging in a scanning electron microscope. Image shows a smooth conical tip without a beveled edge.



Figure 37. Seirin J Type No. 8 0.30 x 40 mm needle packaging as documented by macro-photography on a copy stand.

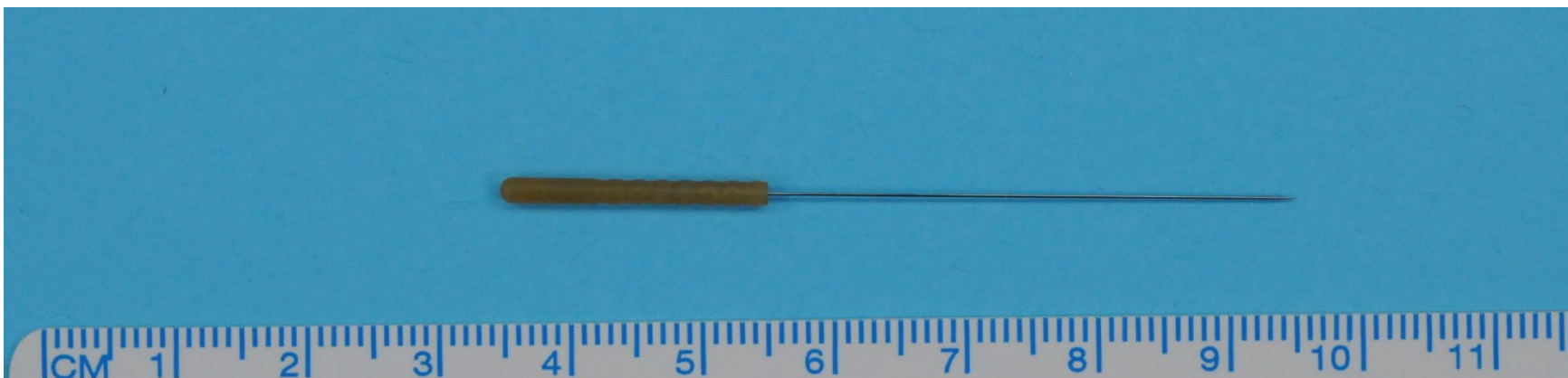


Figure 38. Seirin J Type No. 8 0.30 x 40 mm needle as documented by macro-photography on a copy stand.



Figure 39. Seirin J Type No. 8 0.30 x 40 mm individual needle as observed by stereomicroscopy. Inset shows a human head hair at the same magnification.

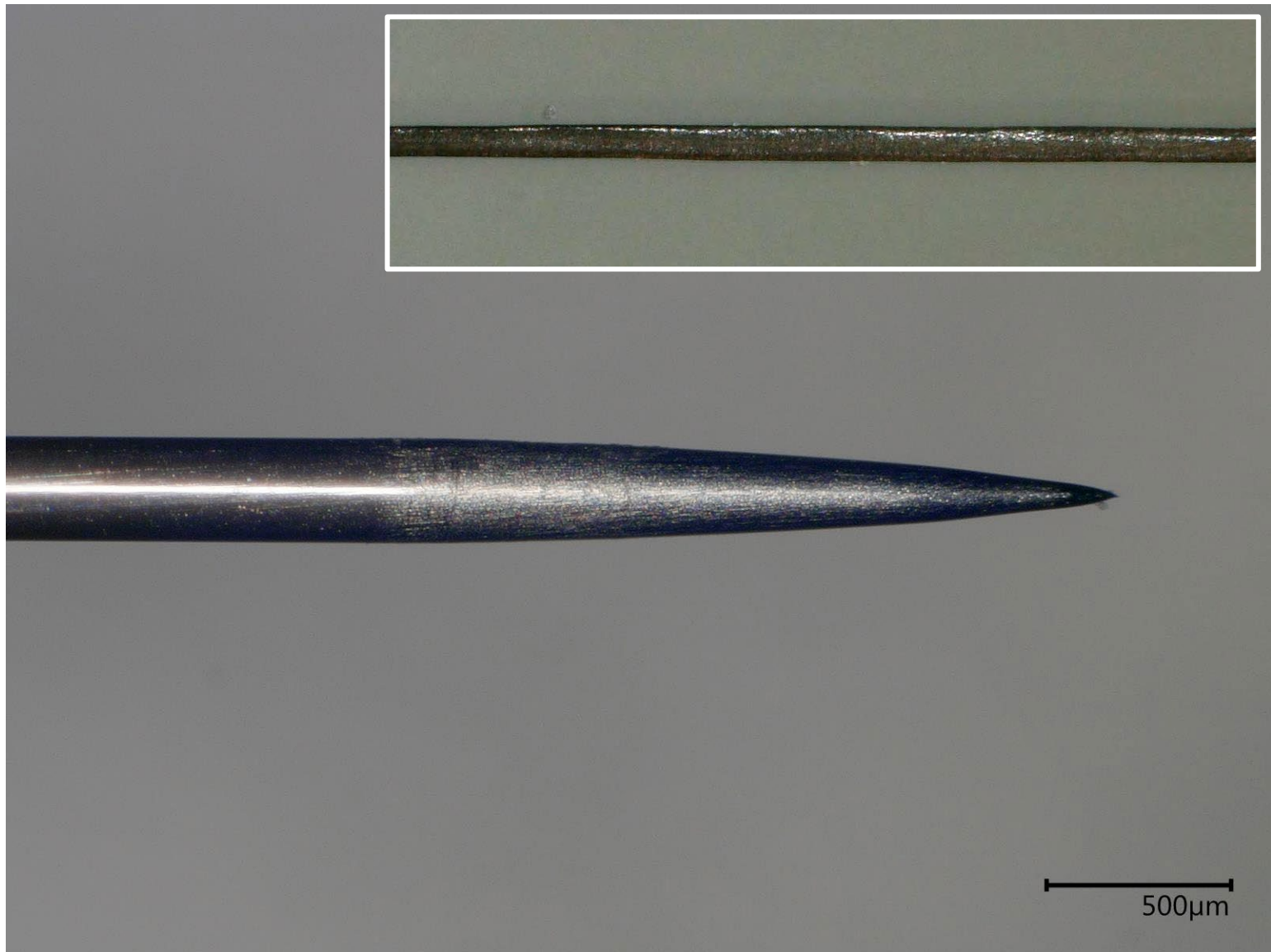


Figure 40. Seirin J Type No. 8 0.30 x 40 mm individual needle tip as observed by stereomicroscopy. Inset shows a human head hair at the same magnification.

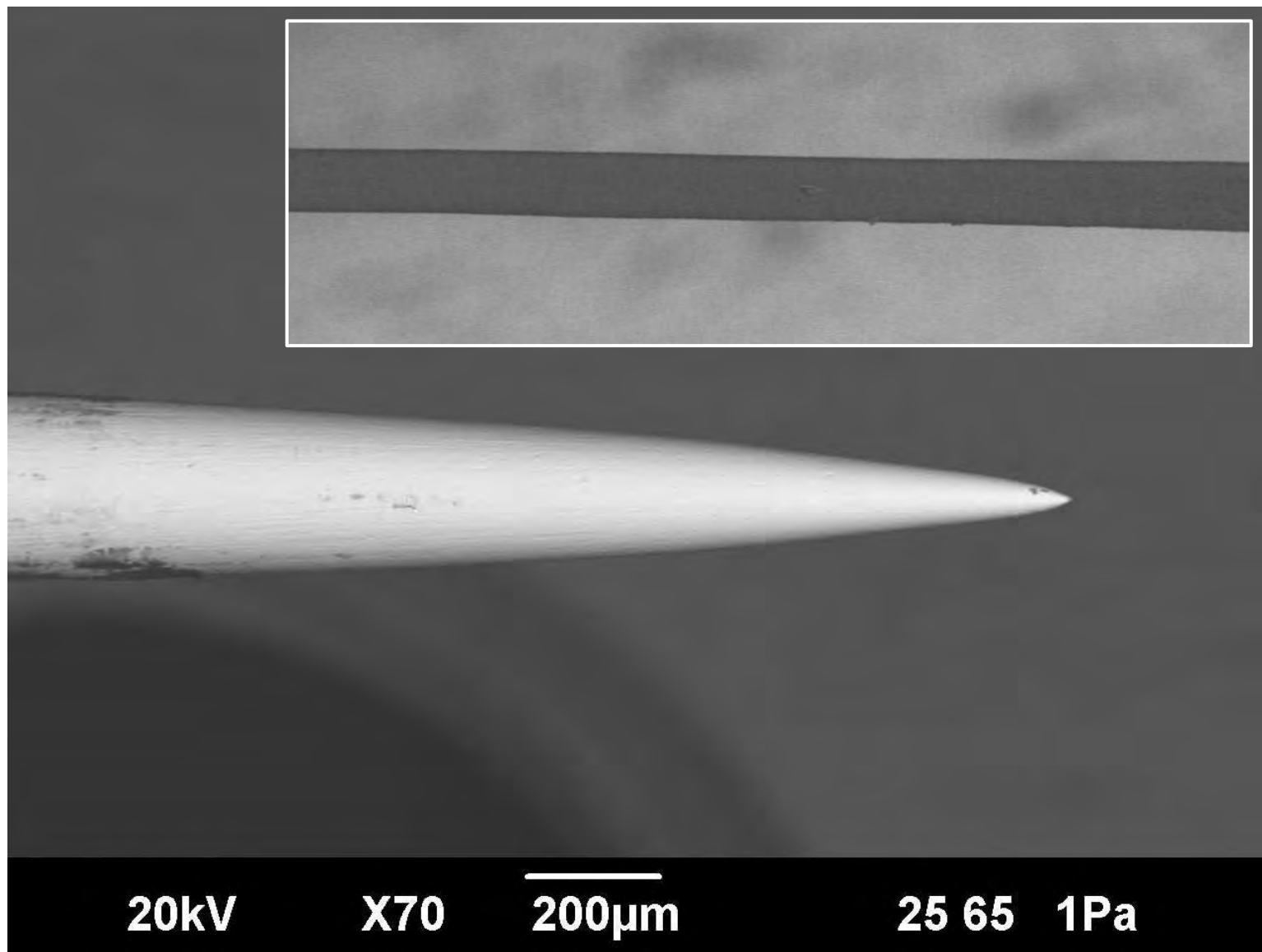


Figure 41. Seirin J Type No. 8 0.30 x 40 mm individual needle tip as observed with backscatter imaging in a scanning electron microscope. Inset shows a human head hair at the same magnification.

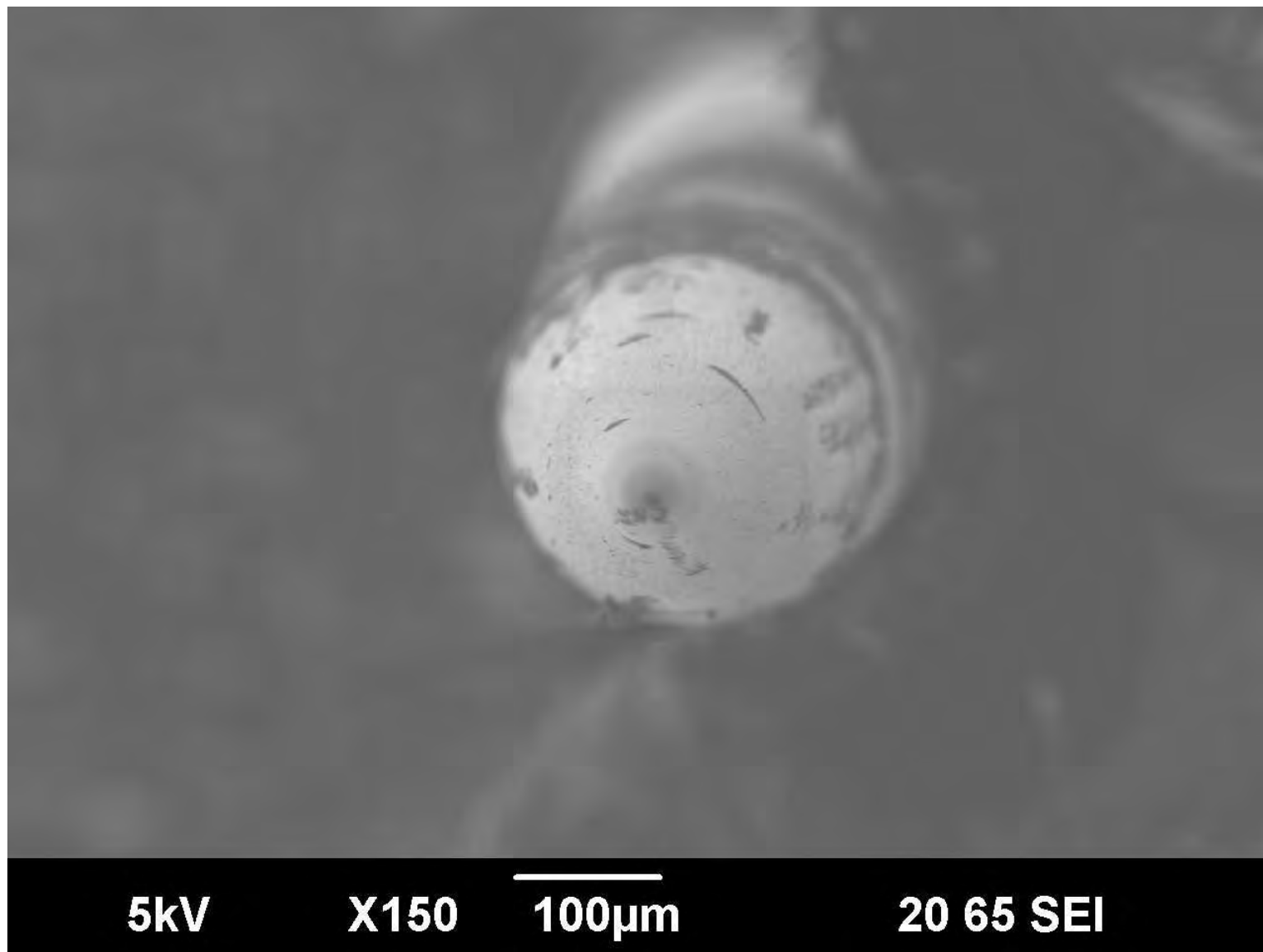


Figure 42. Seirin J Type No. 8 0.30 x 40 mm individual needle tip as observed with secondary electron imaging in a scanning electron microscope. Image shows a smooth conical tip without a beveled edge.

EXHIBIT B-2

Curriculum Vitae

of

Christopher Samuel Palenik, Ph.D.

(cpalenik@microtrace.com)

Current as of 5/17/2022

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Educational History

| | |
|-----------|--|
| 2002-2004 | University of Michigan, Department of Geological Sciences Ph.D. Geology Dissertation Chair: Prof. Rodney C. Ewing Dissertation Committee: Prof. Eric J. Essene, Prof. Ronald Fleming, Prof. Lumin Wang, Prof. Lynn Walter DOE-OCRWM fellowship recipient Horace H. Rackham 2004 Distinguished Dissertation Award |
| 1999-2001 | University of Michigan, Department of Geological Sciences M.S. Geology Prof. Rodney C. Ewing, Advisor |
| 1995-1999 | University of Chicago B.S. Chemistry, B.S. Geology |
| 1992-1995 | Illinois Mathematics and Science Academy, Aurora, IL |
| 1991-1992 | Saint Edward's Catholic Central High School, Elgin, IL |

Employment

| | |
|----------------|--|
| 2005 - Present | Vice President and Senior Research Microscopist, Microtrace, a forensic laboratory specializing in small particle analysis using microchemistry and microscopy. |
| 2004-2005 | Federal Bureau of Investigation (ORISE sponsored) Post-Doctoral Fellow in the Counter Terrorism and Forensic Science Research Institute. |
| 1999-2004 | Graduate Student Research Assistant in the Electron Microbeam Analysis Laboratory, University of Michigan. Duties include training and assistance to university scientists in TEM, EMPA, XRD, and SEM/EDS. |
| 1999-2000 | Graduate Student Instructor for Determinative Methods (GS-455). Teaching responsibilities included XRD, SEM, Microprobe, Raman, FTIR. |
| 1993-2004 | Microscopist (consultant) at Microtrace, a forensic laboratory specializing in small particle analysis using microchemistry and microscopy. |

Licenses and Registrations

- DEA Licensee to purchase, handle, analyze all scheduled controlled substances
- ATF Manufacturer's Explosive License
- Illinois Explosive License
- USDA soil permit
- Illinois Firearms Owners Identification Card (FOID)

Appointments and Committees

- Chemistry/Instrumental Analysis Scientific Area Committee's (SAC's) Materials (Trace) Subcommittee within the Organization of Scientific Area Committees (OSAC), appointed by Mark Stolorow of the National Institute of Standards (NIST)
 - 2014-2021 – Member (Charter)
 - 2021-present – Affiliate
- North Carolina Forensic Science Advisory Board Member, Charter Member, Appointed by the Attorney General of the State of North Carolina. Acting as an advisor to the NC State Crime Laboratory to strengthen the laboratory system. (2012-present)
- ASTM International, Subcommittees: E30 - Forensic Sciences, E30.01 – Criminalistics, E30.11 - Interdisciplinary Forensic Science Standards, Participating Member (2014-present)
- Scientific Working Group for the analysis of Geological Materials (SWGCEO), charter member (2012-2014).
- Independent Review Board for Lawrence Livermore National Laboratory "U and Pu Impurities" Project (2013)
- UNESCO International Union of Geological Sciences (IUGS) Initiative on Forensic Geology Geological (IoFG) Trace Evidence Advisor. (2011-present)
- FermiLab Community Advisory Board Member (2010)
- Board of Directors, RQA Food Forensics LLC (2008-2016)
- Alumni Board Member, University of Michigan Department of Geological Sciences (2005-2015)

Professional Affiliations

- International Association of Geoanalysts (2016-2017)
- American Society of Trace Evidence Examiners (ASTEE), Charter Member (2009-present)
- American Academy of Forensic Sciences, Fellow (2001-present)
- Midwestern Association of Forensic Scientists, Member (2007–present)
- Mineralogical Society of America (2000-present)
- Geological Society of America (2002-present)
- Sigma Xi – Scientific Research Society, Member (1998-2013)

- American Chemical Society (1998-present)
- State Microscopical Society of Illinois (1998-2000, 2007-2010)
- Materials Research Society (2002-2004)

Honors

- Editorial Board Member of the American Academy of Forensic Sciences, appointment to editorial board (2019)
- Certificate of Recognition by the Midwestern Association of Forensic Scientists for appointment to the Materials (Trace) OSAC Committee, Board of Directors (2015)
- Horace H. Rackham Distinguished Dissertation Award (Highest honor given to dissertations produced under the auspices of the University), University of Michigan (2004)
- John Dorr Graduate Academic Achievement Award – Department of Geological Sciences, University of Michigan (2004)
- Geological Society of America, Travel Grant, (2004)
- Graduate Fellowship Recipient, Department of Energy - Office of Civilian Radioactive Waste Management, (2002-2004)
- Best Paper Award, C.S. Palenik and R.C. Ewing, "Microanalysis of Radiation Damage Across a Zoned Zircon Crystal" - Materials Research Society National Meeting (2001)
- Geological Society of America Travel Grant (2004)
- Scott Turner Research Grant in the Earth Sciences (2001, 2002)
- Member, Rackham Graduate Student Forum (2002)
- Co-President, University of Michigan Geology Club (2000-2002)
- Dean's List, University of Chicago (1995-96, 1997-98, 1998-99)

Expert Testimony and Deposition

- Qualified as expert witness in State, Federal, and Military courts and the International Chamber of Commerce.
- List can be provided upon request.

Additional Training and Experience

-
- Examining Documents Requiring a Multi-Faceted Approach A Hands-on, taught by Todd Welch, D-ABFDE, MAFS 2021 Annual Meeting, (2021)

- State of Illinois Explosive License Training Course, taught by Nick Sterling, Illinois Department of Natural Resources, 1 day, Starved Rock State Park (2021)
- Orbitrap training, taught by Dr. Sean McCormick, Thermo, 3 days at Microtrace (2021)
- Orbitrap familiarization training, taught by James Brammeier, Thermo, 5 days at Microtrace (2021).
- DSC Advanced Applications Workshop, taught by Dr. Aniket, Applications Specialist, Perkin Elmer, 1 day workshop at Microtrace LLC (2019)
- Forensic drug analysis seminar, taught by Terry DalCason, Research Chemist, DEA, retired, 1 day seminar at Microtrace LLC (2019)
- Current topics in asbestos analysis seminar, taught by Dr. Eric J. Chatfield at Microtrace LLC, 1 day seminar (2019)
- Electron Backscatter Diffraction and Aztec HKL Training Course taught by Michael Hjelmstad, Oxford Instruments, 3 day workshop, Pleasanton, California (2019)
- Electron Backscatter Diffraction workshop taught by Richard McLaughlin, Oxford Instruments, 2 day workshop (2019)
- ICP-MS Workshop taught by Dr. Peter C. Weiss at the Forensic Science Institute of the Bundeskriminalamt, Wiesbaden, Germany (2018).
- DOJ Grants Financial Management Training. 8 credit hours. Certificate of Completion (2018).
- Fiber, Dye, and Paint Analysis: Approaches of the Netherlands Forensic Institute (NFI). Lectures and discussions by Jaap van der Weerd, reporting officer on fibre and paint investigations. Lecture and Discussions (2017).
- GSR Analysis and Interpretation. Lectures by Robert Berk, Illinois State Police Crime Laboratory, Retired. Lecture and discussions (2017).
- Advanced Trace Evidence Analysis in The Netherlands (MH17 crash investigation). Lecture and Discussions by Dr. Peter Zoon, Nederlands Forensisch Instituut, Divisie Chemische en Fysische Sporen, Microsporen & Materialen (2017).
- Fluorescence Microscopy. Lectures and Workshop taught by Dr. Steve Ruzin, Director, College of Natural Resources Biological Imaging Facility. 1.5 days of laboratory and lecture (2016).
- μ -XRF of glass: A practical explanation of ASTM E2926. Lectures by Troy Ernst, Michigan State Police Forensic Laboratory and Ted Manasian, Ohio Bureau of Criminal Investigation. Presented by NIJ / RTI (2016).
- Forensic Hair Analysis. Lecture by Dick Bisbing, retired from McCrone Associates and Michigan State Police. 3 days of laboratory and lecture (2015).
- Introduction to Basic Human Body Tissues. Taught by Dr. Lynne Herold, retired from the Los Angeles County Sheriff's Department Scientific Services Bureau. 2 day workshop (2015).
- Pistol Training. Taught by Jerry Kau, NRA-IPA-IA-ISV-IVA-Certified instructor (2015).

- Blood Spatter and trace Evidence in the Sam Shepard Case. Lecture and discussion presented by Bart Epstein (retired Assistant Director of from the Minnesota Bureau of Criminal Apprehension) (2014).
- Asbestos Analysis by TEM - Instruction in the Standard Methods for the Analysis of Asbestos. Taught by James R. Millette, Ph.D. and Steven P. Compton, Ph.D. of MVA Scientific Consultants, Duluth, GA. 3 day workshop (2014).
- Thermal Field Emission SEM Operations Training Course. Taught by Natasha Erdman, Ph.D. and Tony Laudate of JEOL at JEOL USA, Peabody, MA. 2 day workshop (2014).
- Forensic Applications of Infrared and Raman Spectroscopy. Taught by Ed Suzuki, Ph.D. of the Washington State Police Forensic Laboratory at Microtrace, Elgin, IL. 4 day workshop (2013).
- Post Mortem Root Banding Hair Workshop. Taught by Stephen Shaw, Sandy Koch, and Karen Korsberg Lowe of the Federal Bureau of Investigation and Amy Michaud (of the Bureau of Alcohol, Tobacco, Firearms, and Explosives) at the Smithsonian Institute. 1 day workshop (2013).
- Nanotechnologies in Textiles Workshop. Taught by Prof. Seshadri Ramkumar (of Technical Textiles in the Department of Environmental Toxicology, Texas Tech University). Webinar (2013).
- Automotive and Industrial Paint Workshop. Taught by Tim Moczulewski and Jon Granberg of PPG Industries at the Oak Creek, WI Coatings Plant in conjunction with the Midwestern Association of Forensic Scientists Annual Meeting. ½ day workshop (2012).
- The Analysis of Low Explosives. Taught by Edward C. Bender, ATF Laboratory, Retired. Held at Midwestern Association of Forensic Scientists Annual Meeting, Milwaukee, IL. 1 day workshop (2012).
- Optical Mineralogy. Taught by Prof. Mickey Gunter of the University of Idaho. 1.5 day workshop held at Microtrace LLC.
- ISO 17025 Without Tears. Taught by Terry Mills of ANSI-ASQ-FQS, Tampa, FL. Three day workshop (2012).
- Geology of Volcano National Park. Taught by Phillip Ong, M.S. at Volcano National Park, Big Island, HI. One day session (2012).
- Natural Fiber Identification. Taught by Skip Palenik at McCrone Research Institute. One day training session (2011).
- Animal Hair Identification. Taught by Bonnie Yates of the U.S. Fish and Wildlife National Forensic Lab at the National Institute of Justice Trace Evidence Symposium. One Day Workshop (2011).
- Quartz Grain Surface Textures. Taught by Prof. Peter Bull of Oxford University at Microtrace LLC. One Day Workshop (2011).
- Forensic Paint Examinations and Comparisons. Taught by Scott Ryland of the Florida Department of Law Enforcement (2010).
- An Introduction to Glass Science and Technology workshop. Taught by J. Terry Fisk of JTF Microscopy Services (formerly of the Corning Glassworks Research Lab, New York) (2010)

- Wood Identification workshop, taught by Dr. Regis Miller of the Center of Wood Anatomy Research, Forest Products Laboratory (2009)
- Microspectrophotometry User Course. Workshop taught by Dr. Jim Throne of CRAIC instruments at Microtrace (2009)
- Airborne Fungus Spores. Workshop taught by Dr. John Haines of the New York State Museum and Science Services, Albany, NY at McCrone Research Institute (2009)
- Energy Dispersive X-ray Spectroscopy- Thermo Noran System 6. Workshop taught by Dr. Dave West, ThermoFisher Scientific at Microtrace (2009)
- Private workshop on SERS sample preparation and analysis with Dr. Marco Leona of the New York Metropolitan Museum of Art (2008)
- Fluorescence Microscopy Workshop, taught by Dr. Steve Ruzin of the University of California at Berkeley at McCrone Research Institute (2008)
- Cement and Concrete Microscopy, taught by Don Campbell of the Campbell Petrographic Services, Inc. Dodgeville, Wisconsin (2007)
- Heavy Mineral Identification, taught by Maria Mange of the University of California at Davis (2007)
- Forensic Paint Examination, taught by Scott Ryland of the Florida Department of Law Enforcement, Lansing, MI (2007)
- Hardwood Identification workshop, taught by Dr. Regis Miller of the Center of Wood Anatomy Research, Forest Products Laboratory (2007)
- Advances and Changes in Forensic Paint Examination Workshop, taught by Scott Ryland of the Florida Department of Law Enforcement at California Associate of Criminalists Semi-annual workshop (2006)
- Forensic Soil Examination Workshop, taught by Dr. Ray Murray, Dr. Robert Graham, Marianne Stam, Dr. Lynne Macdonald, Dr. George Sensabaugh, Skip Palenik and Chris Palenik, at California Associate of Criminalists Semi-annual workshop.
- Paper Fiber Identification Workshop, taught by Dr. Walter Rantanen of the Integrated Paper Service (2006)
- Wood Identification Workshop, taught by Dr. Walter Rantanen of the Integrated Paper Services (2006)
- Softwood Identification workshop, taught by Dr. Regis Miller of the Center of Wood Anatomy Research, Forest Products Laboratory (2006)
- Orientation Imaging Microscopy and Phase Identification EBSD workshop, taught by David Dingley and Matthew Nowell, TSL/EDAX, Draper, Utah, (2005)
- Forensic Analysis of Paint, taught by Ed Suzuki, Ed Bartick, FBI Academy, Quantico, VA (2004)
- FTIR Spectroscopy, taught by Edward Bartick, John Reffner, Edward Suzuki, FBI Academy, Quantico, VA (2004)

- Cathodoluminescence Microscopy Workshop, taught by V. Barbin, M. Schvoerer, K. Ramseyer, Florence, Italy (2004)
- Spent Nuclear Fuel workshop, Chicago, IL (2004)
- Lock and Security workshop, Folger-Adams Security, Lemont, IL (2004)
- Metal Working instruction workshop, taught by Julian Broad, Shop Supervisor, University of Michigan (2004)
- Scientific Glassblowing workshop, taught by Harald Eberhart, Master Glassblower, Ann Arbor, MI (2003)
- Secondary ionization mass spectroscopy (SIMS) of uraninite, under Prof. M. Fayek, Oak Ridge National Laboratory, TN (2003)
- Spindle Stage Methods workshop, Instructors: Prof. D. Bloss, Prof. M. Gunter, Dr. S. Su, McCrone Research Institute, Chicago, IL (July, 2003)
- Actinide Chemistry workshop, Institute for Transuranic Elements, Karlsruhe, Germany (June 2003)
- Micro-Raman spectroscopy research on radiation damage in zircon, under Prof. L. Nasdala, Universität Mainz, Germany (March 2002)
- Micro-XRF experimentation, Advanced Photon Source, Argonne, IL (2002)
- Engineering Mineralogy of Ceramic Materials workshop, University of Siena, Italy (June 2001)
- Forensic Fiber Examination, Instructor: S. Palenik, Department of Public Safety, Austin, TX (June, 2000)
- Synthesis of Hf-borosilicate glasses, under Prof. L.L. Davis, Pacific Northwest National Laboratory, Hanford, WA (February, 2000)
- Design and development of the "Microtrace Forensic Fiber Reference Collection", with S. Palenik, Microtrace, Elgin, IL (1998-1999)
- Study of automobile paint finish systems, under Dr. W. Stoecklein, Forensic Science Institute of the Bundeskriminalamt, Wiesbaden, Germany (Summer 1998)
- Study of inclusions in the Allende meteorite, Prof. L. Grossman and Dr. S. Simon, Department of Geophysical Sciences, University of Chicago (1996-1998)
- Mentorship study of Gel-based inks, under L. Olson, National Forensic Laboratory, Internal Revenue Service (1994-1995).
- Infrared Spectroscopy Interpretation, Bowdoin College, Maine, (June, 1996)
- Microchemical Methods, Instructor: S. Palenik, McCrone Research Institute, Chicago, IL (1996)
- Scanning Electron Microscopy, Instructor: Stevens, McCrone Research Institute, Chicago, IL (1994)
- NMR Spectroscopy use and interpretation, IMSA, Aurora, IL (1993-1995)
- Polarized Light Microscopy, Instructor: J. Delly, McCrone Research Institute, Chicago, IL (1992)

Analytical Techniques

Include but are not limited to: Polarized light microscopy, thermal microscopy, scanning electron microscopy, electron microprobe, energy dispersive X-ray spectroscopy, high-resolution transmission electron microscopy, Raman microspectroscopy, infrared microspectroscopy, cathodoluminescence, UV/visible spectroscopy, scanning white light interferometry, UV/visible/near infrared microspectrophotometry, powder x-ray diffraction, micro-X-ray fluorescence, phase contrast microscopy, differential interference contrast microscopy, fluorescence microscopy, gas chromatography-mass spectrometry, ultra-high performance liquid chromatography, high resolution mass spectrometry, electron backscatter diffraction, differential scanning calorimetry, thin layer chromatography.

Research Grants

The development of objective approach to the characterization and interpretation of paint evidence by SEM/EDS (National Institute of Justice, 2017-IJ-CX-0027) – Role: Principal Investigator

Nanotrace: Applications of subvisible to nanoscale particles in trace evidence (National Institute of Justice, 2015-DN-BX-K0033) – Role: Principal Investigator

Advanced research in Microspectrophotometry of Fibers: Analysis and Interpretation (National Institute of Justice, 2012-DN-BX-K040) – Role: Principal Investigator

Development of a Turnkey Analytical System for the Forensic Comparison and Identification of Fiber Dyes on Casework-sized Fibers (National Institute of Justice, 2012-DN-BX-K42) – Role: Principal Investigator

Raman spectroscopy of automotive and architectural pigments: in situ identification and evidentiary Significance (National Institute of Justice, 2011-DN-BX-K557) – Role: Principal Investigator

Fundamentals of Forensic Pigment Identification by Raman microspectroscopy: A practical identification guide and spectral library (National Institute of Justice, 2010-DN-BX-K236) – Role: Principal Investigator

Graduate Committees

Samuel Yatzkan (2017) Detection and Persistence of Gunshot Residue (GSR) on Facial Features using SEM/EDX. Master of Science in Forensic and Investigative Science, West Virginia University. Additional committee members: Prof. Keith Morris (chair) and Prof. Susan Bell.

Barbara Fallon (2016) A Tale of two corchorus species: jute and its substitutes in commercial goods. Forensic Science – Master of Science, Michigan State University. Additional committee members: Prof. Ruth Smith (chair) and Prof. Jeremy Wilson.

Katelyn Hargrave (2013) A New Technique for the Identification of Dyes Extracted from Fibers. Master of Science in Forensic Science, University of Illinois at Chicago.

Publications and Teaching

Courses and Workshops Taught

Beyond Comparison: An introduction to trace evidence. (2021) Seminar lecture to the Winter 2021 semester "Forensic Science Seminar Series" hosted by Prof. David R. Fisher at the New Jersey Institute of Technology, 5 March 2021.

Development of an objective approach to the characterization and interpretation of paint evidence by SEM/EDS. (2019) Forensic Technology Center of Excellence Webinar Series - Emerging Research: Forensic Chemistry, 4 April 2019.

Applications of Raman Spectroscopy for Trace Evidence Examinations (2018) – workshop taught by Buzzini, P, Suzuki, E.M., Palenik, C.S., Bowen, A.M. at the American Academy of Forensic Sciences Annual Meeting, Seattle, WA.

Advanced Trace Evidence Analysis (2016). Topics included: dye and pigment identification, soil analysis, nanoparticle analysis – workshop taught by Palenik C. at the 8th Annual Asian Network of Forensic Sciences meeting, Bangkok, Thailand.

Petrographic identification of soil minerals (2015) - workshop taught by Palenik, S. and Palenik, C.S. at the National Institute of Justice Impression, Pattern and Trace Evidence Symposium (IPTES), San Antonio, TX.

Applications of Raman Spectroscopy for Trace Evidence Examinations (2014) – workshop taught by Buzzini, P, Suzuki, E.M., Palenik, C.S., Bowen, A.M. at the American Academy of Forensic Sciences Annual Meeting, Seattle, WA.

What did you just step in? (2011) – workshop taught with Mooney, K.E., Flohr, D.B., Bowen, A, Stoney, D, Bisbing, R., Hopen, T., Murray, R., Palenik, C.S., Palenik, S., Schneck, W.M., Stam, M. at the American Academy of Forensic Sciences Annual Meeting, Atlanta, GA.

Classification of Pigments by Raman Spectroscopy (2011) – workshop taught at the Midwestern Association of Forensic Sciences Ruby Jubilee Meeting, Lombard, IL.

Identification of Animal Hairs (2011) – workshop taught with Skip Palenik and Jason Beckert at the American Academy of Forensic Sciences Annual Meeting, Chicago, IL.

Advanced Hair and Fiber Microscopy – synthetic fiber section (2009) taught with Skip Palenik and Jason Beckert at McCrone Research Institute, Chicago, IL.

#Methods in Stereomicroscopy (2009) Customized Class. Rockville, MD.

#Forensic Pigment Analysis (2009) National Institute of Justice (NIJ) Trace Evidence Symposium, Clearwater Beach, FL.

Special topics in Forensic Science (2008) taught with Skip Palenik and Jason Beckert at McCrone Research Institute, Chicago, IL.

#Palenik, C.S (2005-2008) Trace evidence in forensic science. Seminar presented at Northwestern University Forensic Science Series, Chicago, IL (presented annually)

Introductory workshop to Forensic Microscopy (2007) taught with Skip Palenik at the Federal Bureau of Investigation (FBI) / National Institute of Justice (NIJ) Trace Evidence Symposium, Clearwater Beach, FL.

Book Chapters and Peer Reviewed Reports

Palenik, C.S. (2015) Forensic Microscopy in Forensic Chemistry (ed. Jay Seigl) American Academy of Forensic Sciences under Wiley Publications.

Palenik, C.S., Beckert, J.C., Palenik, S.J. (2015) Microspectrophotometry of Fibers: Advances in Analysis and Interpretation. Submitted in completion of NIJ grant 2012-DN-BX-K040, 421p.

Palenik, C.S., Palenik, S., Groves, E., Herb, J. (2013) Raman spectroscopy of automotive and architectural paints: in situ pigment identification and evidentiary significance. Submitted in completion of NIJ grant 2011-DN-BX-K557.

Palenik, C.S., Palenik, S., Herb, J., and Groves, E. (2011) Fundamentals of Forensic Pigment Identification by Raman Microspectroscopy: A practical identification guide and spectral library for forensic science laboratories. Submitted in completion of NIJ grant 2010-DN-BX-K236, 572p.

Palenik, C.S. and Buscaglia, J. (2007) Applications of cathodoluminescence in Forensic Science, in Forensic analysis on the Cutting Edge: new methods for trace evidence analysis, ed. R. Blackledge, Wiley.

Palenik, C.S. (2004) Isotopic and Neutronic Composition of the Okelobondo Natural Nuclear Reactor. Ph.D. Thesis, University of Michigan.

Palenik, S.J. and Palenik, C.S. (2004) Microscopy and microchemistry of physical evidence, in Forensic Science Handbook II, 2nd ed. Ed. R. Saferstien, Prentice Hall.

Journal Articles

Beckert, K. and Palenik, C.S. (2020) The Analysis of 3D Printer Dust for Forensic Applications
DOI:10.1111/1556-4029.14486

White, K. and Palenik, C.S. (2020) Toner particles as forensic evidence: Microanalytical characterization of known toner and recognition of toner in environmental samples. 10.1111/1556-4029.14501

Palenik, C.S. (2019) The Role of Collections in Trace Evidence. The Microscope, 67(2).

Palenik, C.S., Groves, E., Insana, J., Palenik, S. (2019) Locating, Identifying and Comparing Sub Visible Paint Particles. Journal of Forensic Sciences. doi: 10.1111/1556-4029.14062.

Palenik, C.S., Brinsko-Beckert, K., Insana, J., and Palenik, S.J. (2018) Analytical and transfer characteristics of a fluorescent detection spray: Implications for subvisible and nanotrace particle transfers. Forensic Science International Volume 286, May 2018, 96-105.

Groves, E.G., Palenik, S.J., and Palenik, C.S. (2018) A Generalized Approach to Forensic Dye Identification: Acquisition and Development and Utility of Reference Libraries. Journal of the American Association of Analytical Chemists (JAOAC) 101(5) 1385-1396.

Groves, E.G., Palenik, S.J., and Palenik, C.S. (2018) Reproducibility of high-performance thin-layer chromatography (HPTLC) in textile dye analysis. Forensic Chemistry, 8, 104–110.

Groves, E.G., Palenik, S.J., and Palenik, C.S. (2016) A Survey of Extraction Solvents in the Forensic Analysis of Textile Dyes. Forensic Science International (268) 139-144.

Groves, E.G. and Palenik, C.S. (2016) Applications of Blue Light Curing Acrylic Resin to Forensic Sample Preparation and Microtomy. Journal of Forensic Science. March 2016, Vol. 61, No. 2 489-493.

Palenik, C.S. and Palenik, S. (2014) Seeing Color: Practical Methods in Pigment Microscopy. *The Microscope*, v62, 51-61.

Trejos, T., Koons, R., Becker, S., Berman, T., Buscaglia, J., Duecking, M., Eckert-Lumsdon, T., Ernst, T., Hanlon, C., Heydon, A., Mooney, K., Nelson, R., Olsson, K., Palenik, C., Pollock, E.C., Rudell, D., Ryland, S., Tarifa, T., Valadez, M., Weis, P., Almirall, J. (2013) Cross-validation and evaluation of the performance of methods for the elemental analysis of forensic glass by μ -XRF, ICP-MS, and LA-ICP-MS. *Anal Bioanalytical Chemistry*, 405: 5393-5409 (DOI 10.1007/s00216-013-6978-y).

Jantzi, S.C., Trejos, T., Zdanowicz, V. Dalpe, C., Palenik, C.S., Koons, R. Becker, S., Pollock, E.C., Hanlon, C., Almirall, J.R. (submitted) Inter-laboratory comparison of laser ablation inductively-coupled plasma mass spectrometry (LA-ICP-MS), micro X-ray fluorescence (μ XRF) and laser-induced breakdown spectroscopy (LIBS) methods for bulk soil analysis. *Forensic Science International*.

Palenik, C.S. and Diaczuk P. (2013) Plumbum microraptus: Microscopic indicators of a bullet hole in a synthetic fabric. *The Microscope Journal* and reprinted in the *Journal of the American Society of Trace Evidence Examiners* (Volume 4, Issue 2, August 2013).

Ernst, Troy, Berman, Ted, Buscaglia, JoAnn, Eckert-Lumsdon, Tiffany, Hanlon, Christopher, Olsson, E. Kristine, Palenik, Christopher, Ryland, Scott, Trejos, Tatiana, Valadez, Melissa, Almirall, Jose (submitted 2012) Chemistry Signal-to-noise ratios in forensic glass analysis by micro x-ray fluorescence spectrometry. *X-ray Spectrometry*. DOI 10.1002/xrs.2437

Trejos, T, Koons, R., Becker, S., Berman, T., Buscaglia, J., Duecking, M., Eckert-Lumsdon, T., Ernst, T. Hanlonh, C., Heydoni, A., Mooney, K., Nelson, R., Olssonk, K., Palenik, C., Pollock, E.C., Rudelli, D. Ryland, S., Tarifaa, A., Valadez, M., Weisc, P. Almirall, J. (2) Forensic analysis of glass by μ -XRF, SN-ICP-MS, LA-ICP-MS and LAICP-OES: Evaluation of the performance of different criteria fo comparing elemental composition. *Journal of Analytical Atomic Spectrometry*, 38, 1270-1282. DOI: 10.1039/c0xx00000x.

Trejos, T, Koons, R., Becker, S., Berman, T., Buscaglia, J., Duecking, M., Eckert-Lumsdon, T., Ernst, T. Hanlonh, C., Heydoni, A., Mooney, K., Nelson, R., Olssonk, K., Palenik, C., Pollock, E.C., Rudelli, D. Ryland, S., Tarifaa, A., Valadez, M., Weisc, P. Almirall, J. (accepted) Forensic analysis of glass by μ -XRF, ICP-MS, LA-ICP-MS and LA-ICP-OES - Part I: Method Standardization

Egan, J.M.; Mooney, K.; Palenik, C.S.; Mueller, K.T., and Golombeck, R. (2006) Synthesis, Isolation, and Characterization of Chlorinated Products of Bleached 1-(methylamino)anthraquinone. *Journal of Forensic Sciences*.

Reich, M., Kesler, S.E., Utsunomiya, S., Palenik, C.S., Chrysosoulis, S.L., and Ewing, R.C. (2005) Solubility of gold in arsenian pyrite. *Geochimica et Cosmochimica Acta*, 69, 2781-2796.

Palenik, C.S. and Palenik, S.J. (2004) Forensic Science and Academic Science, Comment on Forensic Science: Oxymoron? *Science*, 303, 1136.

Utsunomiya, S., Palenik, C.S., Valley, J.W., Cavosi, A.J., Wilde, S.A. and Ewing, R.C. (2004) Nanoscale behavior of Pb in an Archean zircon. *Geochimica et Cosmochimica Acta*, 68, 4679-4686.

Ewing, R.C., Palenik, C.S. and Konikow, L. (2004) Comment on: "Probabilistic Risk Analysis for a High-Level Radioactive Waste Repository" by B. L. Cohen in *Risk Analysis*, vol. 23, 909-915, *Risk Analysis*, in press.

Palenik, C.S., Utsunomiya, S., Reich, M., Kesler, S.E. and Ewing, R.C. (2004) Invisible Gold Revealed: Direct imaging of gold nanoparticles from a Carlin-type deposit. *American Mineralogist*, 89, 1359-1366.

Davis, L.L., Darab, J.G., Qian, M., Zhao, D., Palenik, C.S., Li, H., Strachan, D.M. and Li, L. (2003) Hafnium in peralkaline and peraluminous boro-aluminosilicate glass and glass sub-components: a solubility study. *Journal of Non-Crystalline Solids*, 328, 101-122.

Palenik, C.S., Nasdala, L. and Ewing, R.C. (2003) Radiation damage in a zircon. *American Mineralogist*, 88, 770-781.

Jensen, K.A., Palenik, C.S. and Ewing, R.C. (2002) U^{6+} -phases in the weathering zone of the Bangombe U-deposit: Observed and predicted mineralogy. *Radiochimica Acta*, 90, 1-9.

Palenik, C.S. (2000) The role of the forensic scientist in the new millennium. *Academy News (American Academy of Forensic Sciences)*, 23-24.

Palenik, C.S. (1989) The microscopical differentiation of dog and cat hairs, *The Microscope*, 38(4), 415-421.

Conference Proceedings

Palenik, C.S., Jensen, K.A. and Ewing, R.C. (2004) The impact of uncertainties in geochemical modeling on performance assessments: Lessons from natural analogues. *Materials Research Society Spring Meeting*, San Francisco, CA.

Palenik, C.S. and Ewing, R.C. (2002) Microanalysis of radiation damage across a zoned zircon crystal. *Proceedings of the Materials Research Society*, 713, JJ8.8.1-JJ8.8.6.

Zhao, D., Davis, L.L., Li, L., Palenik, C.S., Wang, L.M., Strachan, D.M. and Ewing, R.C. (2000) Gadolinium and hafnium alumino-borosilicate glasses: Gd and Hf solubilities. *Proceedings of the Materials Research Society*, vol. 608, 683-689.

Other Publications

Palenik, C.S. (2020) Resolving the Source of Foreign Matter in Formulations. In *Powder and Bulk Solids*. Published online 26 June 2020 (<https://www.powderbulksolids.com/screening-separation/resolving-source-foreign-matter-formulations>). Print version in September 2020 issue.

Palenik, C. S.; Palenik, S.; Groves, E. (2019). Microscopy | Forensic Microscopy. In Worsfold, P., Poole, C., Townshend, A., Miró, M., (Eds.), *Encyclopedia of Analytical Science*, (3rd ed.). vol. 7, pp 57–64, Elsevier.

Palenik, C.S. and Jackson, G. (2016) Forensic Myths and Methods. *The Analytical Scientist*, March 2016 #38, 24-32.

Palenik, C.S., Palenik, S.J., and Groves, E.G. (2014) Forensic Microscopy, In: Reedijk, J. (Ed.) *Elsevier Reference Module in Chemistry, Molecular Sciences and Chemical Engineering*. Waltham, MA: Elsevier. 07-Aug-14 doi: 10.1016/B978-0-12-409547-2.11426-X.

Palenik, C. and Nytes, B. (2014) Mercury Wings, (ed.) Bethany Halford in *Chemical and Engineering News*, Newsprints. Volume 92 Issue 22, p40, June 2, 2014.

Palenik, C. (2013) Consumer Complaint Sample Analyses: Considerations for Outsourcing Sample Analysis, Submitted to Society of Consumer Affairs Professionals – Customer Relationship Management CRM Magazine. Summer 2013.

Palenik, C. (2011) A Better Fate For Mercury?, Letter to the Editor, *Chemical and Engineering News*, 18 April 2011, 89(16), p6.

Palenik, C. (2005) Big "I" in Owens. Letter to the Editor, New York Times, November 13.

Utsunomiya, S., Palenik, C.S., and Ewing, R.C. (2004) Nano- to Atomic Scale Imaging of Heavy Trace Metals Utilizing Advanced Microscopy Techniques in The Dekker Encyclopedia of Nanoscience and Nanotechnology. Marcel Dekker Pub., NY

Palenik, C.S. and Palenik, S.J. (2004) Forensic Microscopy, in Encyclopedia of Analytical Sciences, 2nd Ed., eds. Worsfold, P., Townshend, A and Poole, C. Elsevier, NY.

Palenik, C.S. and Palenik, S.J. (1999) Forensic Fiber Reference Collection Manual. Microtrace: Elgin, IL 46p.

Palenik, S.J. and Palenik, C.S. (1999) Forensic Fiber Identification Course Guide. Microtrace: Elgin, IL, 32p.

Abstracts and Talks

*Keynote or Plenary address; #Invited talk; ^Session chair, %Scheduled/Accepted

Brown, S, Messé, G., Notari, C., Garvin, H., Gogola, N., Maxwell, V., Reffner, J.A., De Forest, P.R., Palenik, C.S., Harrington, P., Huck-Jones, D., O'Donnell, B., Whitley, A., Kammrath, B.W. (2021) Soil Mineral Analysis by Particle Correlated Raman Spectroscopy (PCRS): Optimized Dispersion and Double-Pass Raman Analysis. Eastern Analytical Symposium.

Brown, S., Messe, G, Garvin, H, Gogola, N. Notari, C. Maxwell, V. Reffner, J.A., De Forest, P.R., Palenik, C.S., de B. Harrington, P., Huck-Jones, D., O'Donnell, B., Whitley, A., Kammrath, B.W. (submitted, 2021) Mineral Analysis by Particle Correlated Raman Spectroscopy (PCRS): Optimized Dispersion and Double-Pass Raman Analysis, American Academy of Forensic Sciences 2022 Annual Meeting.

#Palenik, C.S. (2021) Reference Collections and their use in Forensic Fiber Analysis, presented at the virtual 2021 Online Trace Symposium on 29 July 2021.

Gogola, N., Garvin, H., Brown, S. Reffner, J.A., De Forest, P.R., Palenik, C.S., de B. Harrington, P., Huck-Jones, D. O'Donnell, B. Whitley, A. Kammrath, B.W. (2021) Soil Mineral Analysis by Particle Correlated Raman Spectroscopy (PCRS): Sample Preparation and Raman Analysis Optimization. 10th Annual Forensic Science Symposium hosted by the Global Forensic and Justice Center at FIU.

Gogola, N., Garvin, H., Brown, S. Reffner, J.A., De Forest, P.R., Palenik, C.S., de B. Harrington, P., Huck-Jones, D. O'Donnell, B. Whitley, A. Kammrath, B.W. (2021) The Effects of Sample Preparation Optimization on Soil Mineral Analysis by Particle-Correlated Raman Spectroscopy (PCRS) American Academy of Forensic Sciences 2021 National Meeting.

Garvin, H., Gogola, N. , Brown, S. Maxwell, V. Reffner, J.A., De Forest, P.R., Palenik, C.S., de B. Harrington, P., Huck-Jones, D., O'Donnell, B., Whitley, A., Kammrath, B.W., (2021) Soil Mineral Analysis by Particle Correlated Raman Spectroscopy (PCRS): Method Optimization. American Academy of Forensic Sciences 2021 National Meeting.

Kammrath, B.W., Garvin, H., Gogola, N., Brown, S., Reffner, J.A., De Forest, P.R., Palenik, C.S., Harrington, P., Huck-Jones, D., O'Donnell, B., Whitley, A. (2021) Soil Mineral Analysis by Morphologically-Directed Raman Spectroscopy: Method Optimization. Pittcon 2021.

#Palenik, C.S. (2020) Oblique Illuminations. Talk in the Ernst Abbe Award session honoring Brian J. Ford. Eastern Analytical Symposium.

#Palenik, C.S. (2020) Developments in the forensic analysis of automotive paints by SEM/EDS. Pittcon 2020, Chicago, IL.

Palenik, C.S., Groves, E, Michely, L., Lim, Y.C., and Palenik, S.J. (2020) A survey of elements detectable in automotive paint layers by SEM/EDS. American Academy of Forensic Sciences Annual Meeting, Anaheim, CA.

Lewis, A., Palenik, C.S., Palenik, S., Buzzini, P. (2020) Characterization of Nylanthrene Dyes in the Differentiation of Macroscopically Similar Black Fibers using Light Microscopy and Visible Microspectrophotometry. American Academy of Forensic Sciences Annual Meeting, Anaheim, CA.

#Palenik, C.S. (2019) Microanalysis in forensic paint investigations. Midwest Microscopy and Microanalysis Society (M³S), Round Lake, IL.

Brinsko Beckert, K., Palenik, S., Palenik, C.S. (2018) Nanoparticles as Trace Evidence. Joint Meeting of the Southern Association of Forensic Scientists (SAFS) and the American Society of Trace Evidence Examiners in Ashville, NC.

#Palenik, C.S. (2018) Advanced topics in forensic microscopy. Talk given at the Bundeskriminalamt in Wiesbaden, Germany.

Palenik, C.S. and Michely, L. (2018) Analytical considerations for the elemental analysis and forensic comparison of automotive paints. Inter/Micro 2018, Chicago, IL.

White, K.M. and Palenik, C.S. (2018) Product Discoloration: Analysis of an Unknown Red Colorant. Inter/Micro 2018, Chicago, IL

Groves, E.G., Michely, L. and Palenik, C.S. (2018) A Survey of Elements Detected in Multi-layered Automotive Paint Samples by SEM-EDS. Inter/Micro 2018, Chicago, IL.

%White, K.M., Nytes, B.N., and Palenik, C.S. (2018) Applications of Glass Microspheres as Forensic Trace Evidence. Pittcon 2018, Orlando, FL.

%White, K.M. and Palenik, C.S. (2018) Forensic Study of Known Toner Particles. Pittcon 2018, Orlando, FL.

% Brinsko Beckert, K. and Palenik, C.S. (2018) Nanoparticles as trace evidence: Part I. Recognition and collection. Pittcon 2018, Orlando, FL.

% Brinsko Beckert, K. and Palenik, C.S. (2018) The Forensic Analysis of 3D Printer Dust Particles. Pittcon 2018, Orlando, FL.

%Palenik, C.S. (2018) Nanotrace Evidence in Forensic Investigations. National Association of Criminal Defense Lawyers. Making Sense of Science XI: Forensic Science and the Law. Las Vegas, NV.

% Palenik, C.S. (2018) High Order Trace Transfers: Considerations for the analysis of subvisible and nanoparticles. American Academy of Forensic Science 70th Annual Scientific Meeting, Seattle, WA.

% Palenik, C.S. (2018) Fulgurites in litigation. American Academy of Forensic Science 70th Annual Scientific Meeting, Seattle, WA.

Palenik, C.S. (2017) Fulgurites and Forensic Science: A Novel Application of Forensic Geology. Inter/Micro-2017, Chicago, IL.

Insana, J. and Palenik, C.S. (2017) Application of Rietveld Refinement to Forensic Samples. Inter/Micro-2017, Chicago, IL.

White, K.M. and Palenik, C.S. (2017) A Forensic Study of Known Toner Nanoparticles, Inter/Micro-2017, Chicago, IL.

Brinsko Beckert, K. and Palenik, C.S. (2017) The forensic analysis of 3-D printer dust particles. Inter/Micro-2017, Chicago, IL.

#Palenik, C.S. (2017) Scientific Foundations Session 1, National Commission on Forensic Science. National Institute of Justice, Washington, DC.

#Palenik, C.S. (2016) Counterfeit materials and their relation to forensic science. Interpol Forensic Science Managers Symposium, Lyon France.

#Palenik, C.S. (2016) The invaluable role of a technician in forensic science. Fall Annual Meeting of the Midland Section of the American Chemical Society, Midland Michigan.

*Palenik, C.S. (2016) Forensic microscopy and the lost art of observation. Fall Annual Meeting of the Midland Section of the American Chemical Society, Midland Michigan.

#Palenik, C.S. (2016) Advanced trace evidence analysis: from micro to nano. Asian Forensic Sciences Network Annual Meeting 2016, Bangkok, Thailand.

#Palenik, S.J. and Palenik, C.S. (2016) The Utilization of Microscopy in Developing Investigative Leads from the Examination of Microscopic Trace Evidence in Forensic Investigations. Microscopy and Microanalysis 2016 Meeting, Dayton, OH.

Hargrave, K.H., Nytes, B.N., Hopen, T., Palenik, C.S. (2016) Applications of Glass Microspheres as Forensic Trace Evidence. Presentation at Inter/Micro 2016, Chicago, IL.

Groves, E.G. and Palenik, C.S. (2016) A practical approach to forensic dye identification: method and validation. Presentation at Inter/Micro 2016, Chicago, IL.

Palenik, C.S., Groves, E.G., and Palenik, C.S. (2016) Dye Identification in Casework: How far can you go? Presentation at Inter/Micro 2016, Chicago, IL.

Scott, K.R., Palenik, C.S., Palenik, S., Morgan, R.M. (2016) A multidisciplinary approach to the collection and analysis of aquatic trace evidence from clothing exhibits. Australian and New Zealand Forensic Science Society International Symposium. Auckland, New Zealand.

Scott, K., Morgan, R., Palenik, C.S. and Palenik, S.J. (2015) Developing the techniques available for the collection and analysis of forensic evidence in freshwater crime scene environments. National Institute of Justice Impression, Pattern and Trace Evidence Symposium (IPTES), San Antonio, TX.

Fallon, B.L., Palenik, C.S. and Palenik, S.J. (2015) Jute and its Substitutes in Common Goods. National Institute of Justice Impression, Pattern and Trace Evidence Symposium (IPTES), San Antonio, TX.

Palenik, C.S. (2015) Decreasing the Scale and Increasing the Scope of Trace Evidence. National Institute of Justice Impression, Pattern and Trace Evidence Symposium (IPTES), San Antonio, TX.

^Palenik, C.S. (2015) Surrounded by Spheres: Microspheres and nanospheres in the world around us. Inter/Micro 2015. Chicago, IL.

Nytes, B.N., Palenik, C.S., Palenik, S.J. (2015) Microchemistry: Not such a small thing. Inter/Micro 2015. Chicago, IL.

Hargrave, K., Palenik, S.J., Beckert, J., Palenik, C.S. (2015) Characterization of Extracted Dyes by Capillary Microspectrophotometry: Proof of Concept. Inter/Micro 2015. Chicago, IL.

Fallon, B.L., Palenik, C.S., and Palenik, S. (2015) A Tale of Two Corchorus Species: Jute and Its Substitutes in Common Goods. Inter/Micro 2015. Chicago, IL.

^#Palenik, C.S. (2015) Keynote Address. Microscopy and the lost art of observation. SCIX 2015, Providence Rhode Island.

#Palenik, C.S. (2015) Microscopy: My Professional Hobby. State Microscopical Society of Illinois monthly speaker series. Chicago, IL.

Palenik, C.S. and Palenik, S.J. (2015) Microtrace to Nanotrace: Extracting information at increasingly smaller length scales. American Academy of Forensic Sciences Annual Meeting, Orlando, FL.

^,#Palenik, C.S. (2014) Identification and Significance of Colorants in Forensic Casework. World Forensic Festival (IAFS 2014, AFSN 2014, APMLA 2014), Seoul, Korea.

Palenik, C.S. and Palenik, S.J. (2014) Seeing Color: Practical Methods in Pigment Microscopy. Inter/Micro 2014, Chicago, IL.

Hargrave, K., Beckert, J., Palenik, C.S., White, K., Sigman, M. (2014) The Comparison of Similarly Colored Fabrics and Yarns Using Comparison Microscopy and Microspectrophotometry. Inter/Micro 2014, Chicago, IL.

Nytes, B., White, K.M., and Palenik, C.S. (2014) You Found WHAT in Your Pizza?: Characterization of a condom allegedly baked into a pizza. Inter/Micro 2014, Chicago, IL.

White, K.M., Palenik, C.S., Beckert, J.B., and Hargrave, K. (2014) Evaluating Different Methods of Comparison for Fibers with Subtle Variations in Dye Concentration. Inter/Micro 2014, Chicago, IL.

#Palenik, C.S. (2014) Food Forensics: Key Considerations for Consumer Complaint Sample Analysis. Food Labs Conference at PittCon, Chicago, IL.

#Palenik, C.S. (2013) Applications of colorant identification in forensic science. SCIX 2013 Annual Meeting, Milwaukee, WI.

Groves, E. and Palenik, C.S. (2013) The use of blue light curing resins in forensic sample preparation, Inter/Micro 2013, Chicago, IL.

Palenik, C. and Beckert, J. (2013) Between the fringes: overlooked topics in microspectrophotometry, Inter/Micro 2013, Chicago, IL. (abstract accepted, talk not given due to illness)

Groves, E. and Palenik, C.S. (2013) Colorant basics: chemical organization of a dye and pigment database, Inter/Micro 2013, Chicago, IL.

Palenik, S. and Palenik, C.S. (2013) Development of a systematic approach to forensic dye identification, Inter/Micro 2013, Chicago, IL.

Nytes, B., Palenik, S.J. and Palenik, C.S. (2013) Fitting the Mold: An Exploration into Sourcing of Glass Fragments, Inter/Micro 2013, Chicago, IL.

Palenik, C.S. (2013) Microanalytical methods of materials characterization in forensic science. International Cement Microscopy Association Annual Meeting, Rosemont IL.

#Palenik, C.S. and Palenik, S.J. (2013) Applications of Forensic Microanalytical Methods to the Identification and Sourcing of Particulate Matter in Pharmaceutical Products, Microscopy & Microanalysis 2013 sponsored by the Microscopy Society of America, Indianapolis, IN.

Palenik, C.S. (2013) Systematic in situ Identification of Pigments in Paint by Raman Microspectroscopy, AAFS, American Academy of Forensic Sciences National Meeting, Washington, DC.

Palenik, C.S. and Beckert, J.B. (2012) The Forensic Analysis of Paint Evidence Using Micro-Raman Spectroscopy, MAFS 2012, Milwaukee, WI.

Groves, E.G., Herb, J., Palenik, C.S. (2012) Benefits of Using Cross-Sectioning in Forensic Analysis of Automotive Paints, Inter/Micro 2012, Chicago, IL.

Palenik, C.S., Buzzini, P., Herb, J., Groves, E. (2012) The Forensic Analysis of Paint Evidence Using Micro-Raman Spectroscopy Part I: Development of Libraries and Application Methods, Inter/Micro 2012, Chicago, IL.

Buzzini, P., Palenik, C.S., and Massonnet, G. (2012) The Forensic Analysis of Paint Evidence Using Micro-Raman Spectroscopy Part II: Case Examples, Inter/Micro 2012, Chicago, IL

Sliwa, S., Groves, E., Palenik, M.C. (2012) Mapping Elemental and Refractive Index Variation in Container Glass, Inter/Micro 2012, Chicago, IL.

Herb, J., Palenik, C.S., and Palenik, S.J. (2012) Four Score and Seven Years Ago” or Was It? : Authenticating President Abraham Lincoln’s Signature, Inter/Micro 2012, Chicago, IL.

Palenik, C.S. and Palenik, S. (2012) Development of a Pigment Classification Scheme by Raman Spectroscopy. American Academy of Forensic Sciences National Meeting. Atlanta, GA.

#Palenik, C. (2011) Forensic Soil Examination at the NIJ Sponsored Elemental Analysis Working Group Meeting Miami, Florida – October 12-13, 2011.

Buscaglia, J., Palenik, C.S., Brokus, S.A., Silletti, D.K., Cooper, D.E., Purcell, D.K., Peaslee, G.F. (2011) Applications of Cathodoluminescence (CL) Microscopy and Spectroscopy to Forensic Evidence. Presented at Cathodoluminescence (CL 2011), a topical conference (TC) of the Microbeam Analysis Society (MAS), co-sponsored by the Australian Microbeam Analysis Society (AMAS) held at the National Institute of Standards and Technology (NIST), Gaithersburg, MD, USA on October 24-28, 2011.

#Palenik, CS. Beyond Comparison: Developing Investigative Leads from Trace Evidence. Eastern Analytical Symposium. Somerset, New Jersey.

Palenik, CS, Palenik, S., Herb, J., Beckert, J., Nytes, B. Chemical Classification of Pigments by Raman Spectroscopy for Forensic Applications. NIJ Trace Evidence Symposium, Kansas City, MO (2011).

Palenik, CS, Palenik, S., Beckert, J., Nytes, B., Groves, E. (2011) Improvements in analytical precision in the forensic analysis of glass through the use of metal filters in μ -XRF analysis. NIJ Trace Evidence Symposium, Kansas City, MO.

Jantzi, S.C., Trejos, T., Zdanowicz, V., Dalpe, C., Palenik, C.S., Koons, R., Wong, D., Hanlon, C., Pollock, E., Becker, S., Almirall, J. (2011) Inter-Laboratory Comparison of LA-ICP-MS, μ XRF and LIBS methods for Bulk Soil Analysis

Ernst, T., Trejos, T. Valadez, M., Koons, R., Buscaglia, J., Olsson, K., Ryland, S. Berman, T., Eckert-Lumsdon, T. Hanlon, C., Palenik, C., Almirall, J. (2011) When is a peak, a peak? Calculating detection and quantification limits for micro X-ray fluorescence spectrometry of glass samples.

Herb, J.N. and Palenik, C.S. (2011) Use of surface enhanced Raman spectroscopy (SERS) applied to the study of fluorescing pigments and dyes. American Academy of Forensic Sciences National Meeting, Chicago, IL.

Nytes, B.N, Beckert, J., Palenik, C.S., and Palenik, S. (2011) Obtaining investigative forensic information from the analysis of rodents in food products. American Academy of Forensic Sciences National Meeting, Chicago, IL.

Palenik, CS, Wilke, B. (2010) Raman spectroscopy of organic pigments. American Academy of Forensic Sciences National Meeting, Seattle, WA.

Palenik, CS, Nytes, B.N., Beckert, J., Bonta, H, and Palenik, S (2009) Raman spectroscopy of Forensic Evidence. Trace Evidence Symposium (National Institute of Justice (NIJ), Clearwater Beach, FL.

Buscaglia, J., Palenik, C.S., and Peaslee, G. (2009) Trace evidence applications of cathodoluminescence (CL) microspectrophotometry. Trace Evidence Symposium (National Institute of Justice (NIJ), Clearwater Beach, FL.

Wilke, B. and Palenik, C.S. (2009) Organic Pigments: Analytical characterization and classification by Raman spectroscopy. Inter/Micro 09, Chicago, IL.

Palenik, CS, Bonta, H, and Palenik, S (2009) Microanalysis of Architectural Tinting Pigments. American Academy of Forensic Sciences National Meeting. Denver, CO.

#Palenik, CS (2008) Food Forensics: Applications of microscopy and microchemistry to contamination issues in the food industry. Presented to the Griffith Laboratory Global Summit Meeting, Lombard, IL.

#Palenik, CS (2008) Big Picture Clues from Microscopic Particles: Applications of Geology to Forensic Science. Colgate University, NY.

Peaslee, GF, Buscaglia, J, Palenik, CS (2008) Cathodoluminescence as a Forensic Tool. 2008 Joint Meeting of The Geological Society of America, Soil Science Society of America, American Society of Agronomy, Crop Science Society of America, Gulf Coast Association of Geological Societies with the Gulf Coast Section of SEPM. Houston, TX.

Bales, H. and Palenik, CS (2008) Planar Section of Multilayer Paint Chips. Inter/Micro 2008, Chicago, IL.

Palenik, S. and Palenik, CS (2008) A Practical Technique for the Recognition of Modern Sculptures Proffered as Ancient Works of Art. Inter/Micro 2008, Chicago, IL.

Palenik, CS and Bonta, H. (2008) Microanalytical Characterization of Architectural Paint Pigments. Inter/Micro 2008, Chicago, IL.

#Palenik, CS (2008) Workshop on Raman Spectroscopy of Forensic Evidence. International Association of Forensic Sciences Conference Proceedings. New Orleans, LA.

Peaslee, GF, Palenik, CS, and Buscaglia, J (2008) Application of Cathodoluminescence Microspectrophotometry for Forensic Comparison of Concrete Samples. International Association of Forensic Sciences Conference Proceedings.

Palenik, CS, Palenik, S., and Nytes, B. (2008) An introduction to the *in situ* identification of pigments in automobile and architectural paints by Raman microspectroscopy. Proceedings of the American Academy of Forensic Sciences National Meeting, Washington DC.

Palenik, CS and Nytes B (2007) The *in situ* identification of pigments in CMYK printing inks. Inter/Micro 2007, Chicago, IL.

Palenik, CS and Palenik, SJ (2007) Ensuring the Continued Role of Science in the Forensic Examination of Trace Evidence. Proceedings of the 2007 American Academy of Forensic Sciences National Meeting, San Antonio, TX.

Palenik, SJ and Palenik, CS (2007) Developing Investigative Leads through Trace Evidence. Proceedings of the 2007 American Academy of Forensic Sciences National Meeting, San Antonio, TX.

#Palenik, CS (2007) Forensic Trace Evidence: Big Picture Clues from Microscopic Particles. Saturday Science Fun Lecture Series, Freedom Hall, Park Forest, IL.

#Palenik, CS (2006) Trace Evidence for the Public Defender. Missouri State Public Defender Winter Workshop, St. Louis, MO.

#Palenik, CS (2006) Forensic Microscopy of Fibers. Presentation at Philadelphia University seminar series.

#Palenik, CS (2006) Cathodoluminescence in Forensic Science. Presentation Soil Analysis workshop at California Association of Criminalists Fall Seminar.

Palenik, S.J. and Palenik, C.S. (2006) Developing Forensic Investigative Leads through the Microscopical Examination of Trace Evidence. Geological Society of America National Meeting, Philadelphia, PA. GSA Abstracts with Programs 38 (7).

Palenik, C.S. (2006) Novel applications of cathodoluminescence microscopy. Inter/Micro-06, Chicago, IL.

Palenik, C.S. and Buscaglia, J. (2006) Cathodoluminescence in Forensic Science. American Academy of Forensic Sciences National Meeting, Seattle, WA.

Mooney, K.E., Koons, R.D., Buscaglia, J. and Palenik, C.S. (2006) Discrimination of Automobile Side Windows by Micro-XRF. American Academy of Forensic Sciences National Meeting, Seattle, WA.

Palenik, C.S. (2006) From PhD to Professional: Bridging the Gap. 3rd Annual Northwestern University PLU Career Forum.

#Palenik, C.S. (2005) Applications of microscopy and microchemistry in forensic science. Talk given at Chemistry Dept. seminar, University of Wisconsin Platteville.

Egan, J.M., Mooney, K.E., Palenik, C.S., Rickenback, M.P., Golombeck, R.A. and Mueller, K.T. (2005) Synthesis, Isolation, and Characterization of Chlorinated Products of Bank Security Dye Packs Upon Bleaching, Pittcon - 2005, August, 2005.

Palenik, C.S. and Buscaglia, J. (2005) Cathodoluminescence microscopy in forensic science. 2006 Annual meeting of the American Academy of Forensic Sciences. Seattle, WA.

#Palenik, C.S. and Buscaglia, J. (2005) Applications of cathodoluminescence in the forensic analysis of trace evidence. 2005 Annual meeting of SWGMAT (Scientific Working Group for Materials Analysis sponsored by the FBI), Washington, D.C.

*Palenik, C.S. and Buscaglia, J. (2005) Applications of cathodoluminescence in forensic geology. 2005 Goldschmidt Conference, Moscow, Idaho, Geochimica et Cosmochimica Acta.

Fayek, M., Palenik, C.S. and Ewing, R.C. (2005) Characterization of Nd, Te and U isotope ratios in UO₂ using SIMS. 2005 Goldschmidt Conference, Moscow, Idaho, Geochimica et Cosmochimica Acta.

Palenik, C.S., Fayek, M., Fleming, R. and Ewing, R.C. (2004) Isotopic composition and neutronics of the Okélobondo natural nuclear reactor. Geological Society of America, Fall National Meeting, Denver, CO.

Palenik, C.S. (2004) Microanalytical Characterization of a Natural Nuclear Reactor. Inter/Micro-04, Chicago, IL, Microscope, 52, 156.

*Ewing, K.A., Palenik, C.S. and Ewing, R.C. (2004) The natural fission reactors at Oklo, Gabon: Lessons for modeling the long-term behavior of a nuclear waste repository. International Geological Congress, Florence, Italy.

Palenik, C.S., Jensen, K.A and Ewing, R.C. (2004) The impact of uncertainties in geochemical modeling on performance assessments. Materials Research Society Spring Meeting, San Francisco, CA.

Jensen, K.A., Palenik, C.S., Fayek, M., Evins, L.Z., Janeczek, J., and Ewing, R.C. (2003) The spent nuclear fuel analogue of the Oklo-Okélobondo and Bangombé natural fission reactors. Nordic Geological Winter Meeting, Sweden.

Palenik, C.A., Fayek, M., Jensen, K.A., and Ewing, R.C. (2003) Analysis of Fission Products and Pu Migration in the Okelobondo Reactor Zone Using SIMS. Geological Society of America, Fall National Meeting, Seattle, WA, 35(6), 237.

Utsunomiya, S., Palenik, C.S., Ewing, R.C., Valley, J.W., Cavosie, A.J., and Wilde, S.A. (2003) Fate of Pb in an Archean Zircon. Geological Society of America, Fall National Meeting, Seattle, WA 35(6), 594.

Reich, M., Palenik, C.S., Utsunomiya, S., Becker, U, Stixrude, L. Kesler, S.E. and Ewing, R.C. (2003) Solubility Limit of Gold in Arsenian Pyrite from Carlin-Type and Epithermal Deposits: EMPA, SIMS, HRTEM and Quantum-Mechanical Constraints. Geological Society of America, Fall National Meeting, Seattle, WA 35(6), 358.

Palenik, C.S. and Stoecklein, W. (2003) Batch to batch differentiation of automobile paints. Inter/Micro-03, Chicago, IL

Jensen K.A., Palenik C.S., and Ewing R.C. (2003) Thermodynamic prediction of observed uranium minerals in the supergene-weathered Bangombé U-deposit: implications for blind prediction modeling. Uranium Geochemistry 2003, Nancy, France.

Palenik, C.S., Utsunomiya, S, Kesler, S.E. and Ewing, R.C. (2002) Gold nanoparticles in aresenian pyrite from a Carlin-type deposit observed by HRTEM. Geological Society of America, Fall National Meeting, Denver, CO.

Palenik, C.S, Jensen, K.A. and Ewing, R.C. (2002) Thermodynamic prediction of observed uranyl phases in the supergene-weatherd Bangombe U-deposit: Implications for Blind Prediction Modeling. International Mineralogical Association, Scotland, England.

Jensen, K.A., Palenik, C.S., Ewing, R.C. and Burns, P.C. (2001) Uranyl Phases in the Bangombe U-Deposit, Migration '01, Bregenz, Austria.

Jensen, K.A., Palenik, C.S., Ewing, R.C. and Burns, P.C. (2001) Oxidative Alteration of the Oklo-Okelobondo and Bangombe U-Deposits in Gabon: Observed and Predicted Mineralogy, American Chemical Society - Fall National Meeting, Chicago, IL.

Palenik, C.S., Lian, J. and Ewing, R.C. (2001) Microanalysis of radiation damage across a zoned zircon crystal. Materials Research Society, Fall National Meeting, Boston, MA.

Palenik, C.S., Lian, J. and Ewing, R.C. (2001) Zircon as a host for the disposal of Plutonium, Workshop on Engineering Mineralogy of Ceramic Materials, ISEPS, Siena, ITALY.

Jensen, K.A., Palenik, C.S., Ewing, R.C., Burns, P. (2000) The role of sulfates during supergene weathering in the Oklo-Okelobondo uranium deposits, Geological Society of America, Reno, NV.

Stoecklein, W. and Palenik, C.S. (1998) Forensic analysis of automotive paints: Evidential value and the batch problem. Presentation – 4th meeting of the European Paint Group. Paris, France, October 5-6.

Palenik, C.S., (1998) Analysis of Chrome-Bearing Spinel from the Allende Meteorite Geophysical Science Exposition '98, University of Chicago.

Simon, S.B., Grossman, L., Ebel, D., Palenik, C. (1998) Large Relict Chromium Spinel from Allende: A link to Murchison?, 29th Lunar and Planetary Science Conference, Houston, TX.

Palenik, C.S. and Olson, L. (1995) Identification of Gel-Based Inks, INTER/MICRO-95, Chicago, IL.

Palenik, C.S. Original Paint Finish Systems on Foreign Automobiles (1994) INTER/MICRO-94, Chicago, IL.

EXHIBIT C

DECLARATION OF DR. MARK HANSON

1. My name is Dr. Mark Hanson. I am over 18 years old and competent to make this Declaration. I am a resident of Dallas, Texas. The facts stated in this Declaration are true and correct based on my personal knowledge.

2. I have been licensed as a Doctor of Chiropractic in Texas since 1986. Since that time, I have practiced as a chiropractor in private practice.

3. I have been licensed as an acupuncturist in Texas since 1994. Since that time, I have practiced as an acupuncturist in private practice.

4. I have regularly purchased and used acupuncture needles in my practice for decades.

5. In around 1996, I founded the Dallas College of Oriental Medicine. I served as President and Instructor at the college until it closed in 2004. In those roles, I trained acupuncturists and became familiar with the acupuncture needles used in educational settings and by other practitioners.

6. Since 2009, I have owned and operated a clinic named East West Acupuncture and Chiropractic. I regularly provide chiropractic and acupuncture care for patients in my work at that clinic.

7. Through my company Eastern Medicine Institute, I offer training courses and acupuncture supplies, including acupuncture needles, to chiropractors and acupuncturists. Through my business, I have sold many acupuncture needles to both chiropractors and acupuncturists.

8. I commonly use the following acupuncture needles in my practice:

- Seirin J15 Type, 0.16 x 15 mm
- Seirin J Type, 0.25 x. 30 mm


- Seirin J Type, 0.30 x 40 mm
- DBC Spring Singles, 0.18 x 15 mm
- DBC Spring Singles, 0.25 x 40 mm
- DBC Spring Singles, 0.30 x 50 mm
- Tai-Chi 0.35 x 75 mm

9. The acupuncture needles listed in Paragraph 8 all taper to a point at the tip and do not have a beveled or other cutting edge.

10. The acupuncture needles listed in Paragraph 8 are made by three of the most reputable needle manufacturers in the industry and such needles are offered for sale by many different dealers in acupuncture supplies. The website of the Texas Association of Acupuncture and Oriental Medicine has a “Sponsors” page which identifies Golden Needle as a preferred vendor who provides discounts to TAAOM members. (See <https://www.taaom.org/our-sponsors/>.) Golden Needle offers for sale the same or similar needles as identified in Paragraph 8, including needles made by Seirin and DBC. (See <https://www.goldenneedleonline.com/DBC-Spring-Singles/> and <https://www.goldenneedleonline.com/Seirin-J-Propak10-Needles/>.)

I declare under penalty of perjury that the foregoing is true and correct.

Executed in Dallas County, State of Texas, on the date indicated below.


 Dr. Mark Hanson

5/27/2022
 Date