SUPPLEMENTAL FIGURES

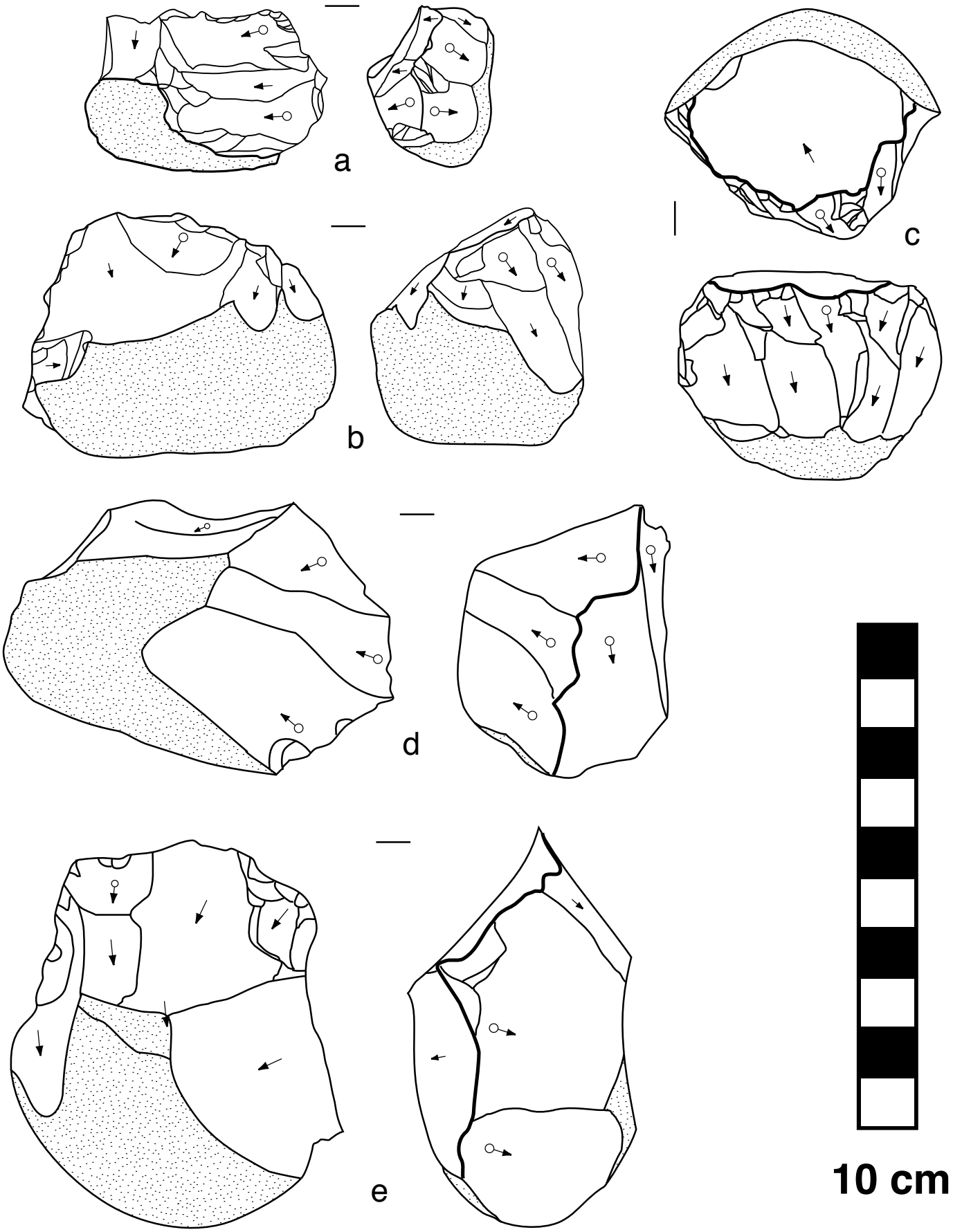

FIGURE 1. Lower Paleolithic pebble cores, a-b, d-e. choppers, c. core-scraper. Source: Ubeidiya (a-e). Redrawn after Bar-Yosef and Goren-Inbar (1993).

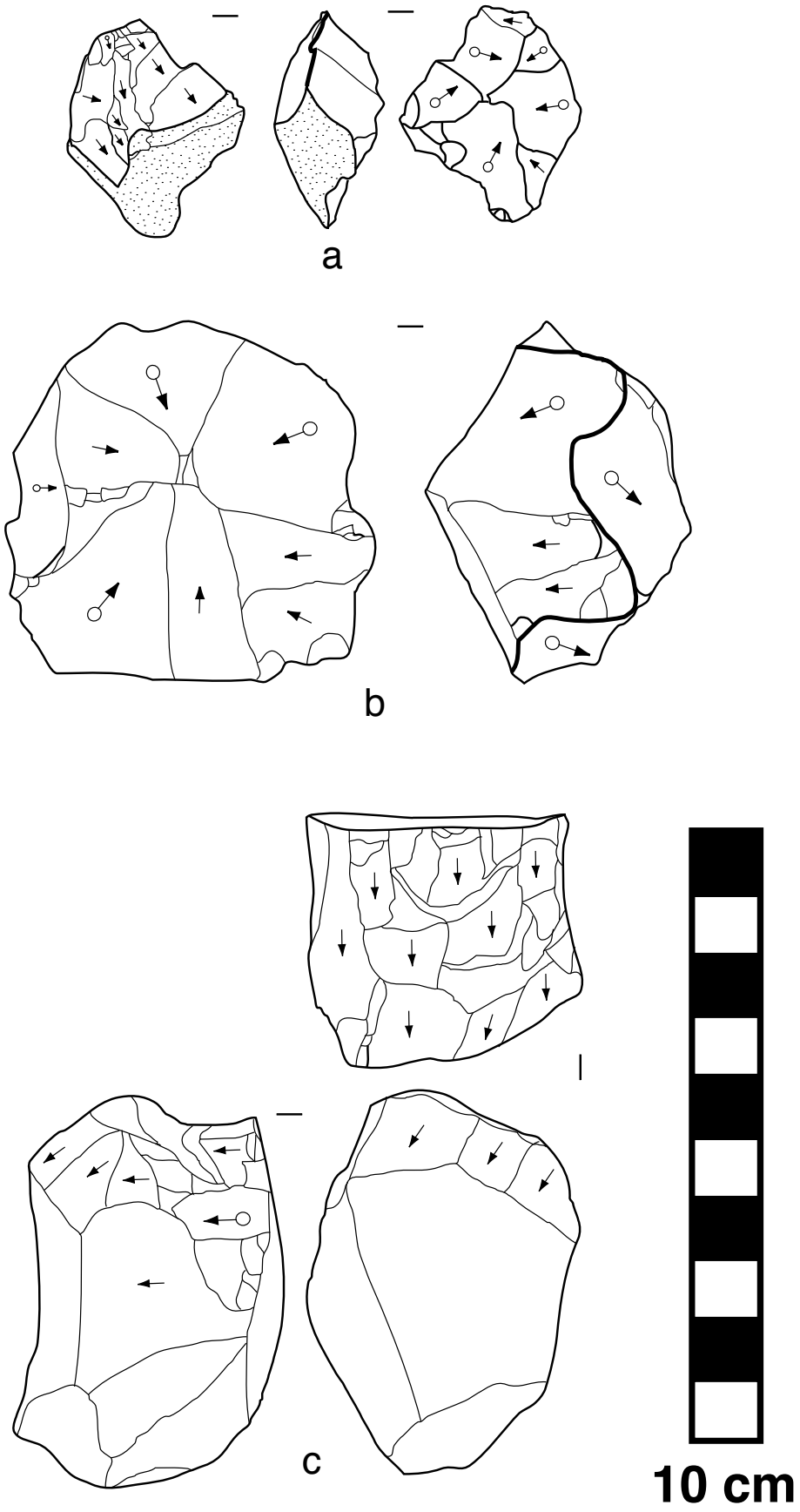

FIGURE 2. Lower Paleolithic pebble cores, a-b, discoids, c. core-scraper. Source: Ubeidiya (a-c). Redrawn after: Bar-Yosef and Goren-Inbar (1993).

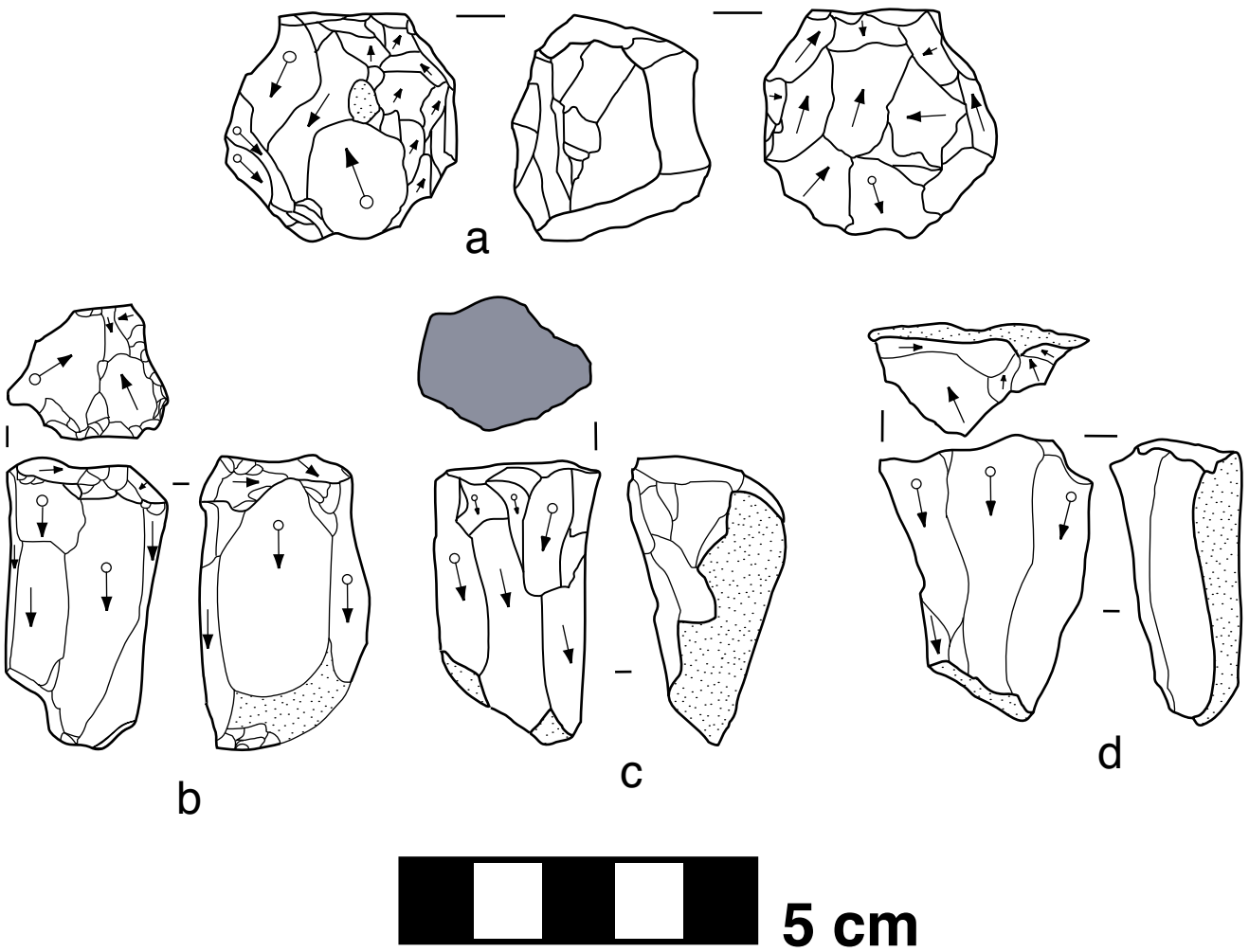

FIGURE 3. Lower Paleolithic pebble cores, a. polyhedron, b-d. blade cores. Sources: Ubeidiya (a), Qesem Cave (b), Adlun/Abri Zumoffen (c-d). Redrawn after a. Bar-Yosef and Goren-Inbar (1993), Barkai, et al. (2006), Roe (1983).

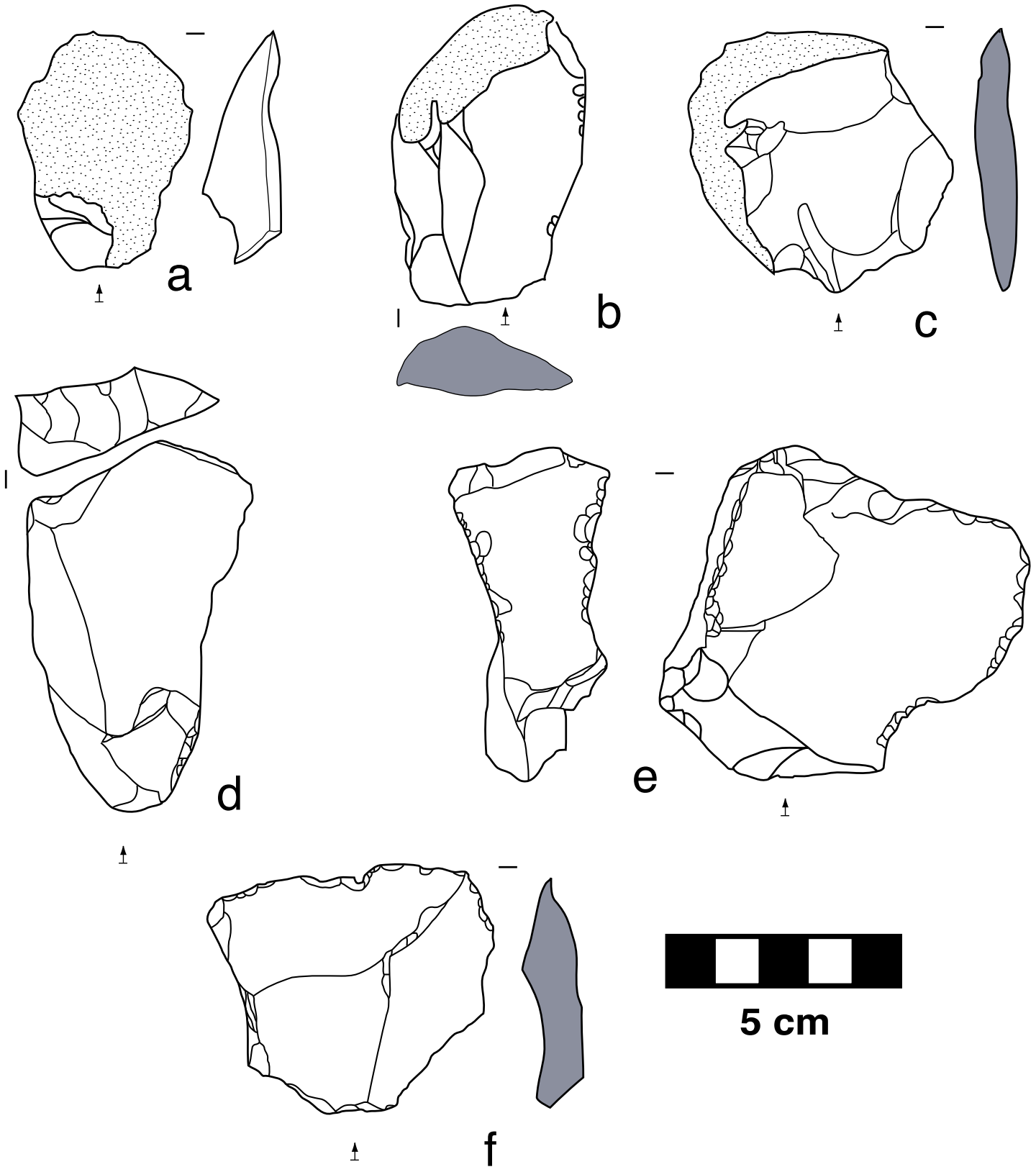

Figure 4. Flakes from pebble cores: a–c. cortical flakes, d–e. core-trimming elements, f. noncortical flake. Source: Ubeidiya: (a–f). Redrawn after Bar-Yosef and Goren-Inbar (1993).

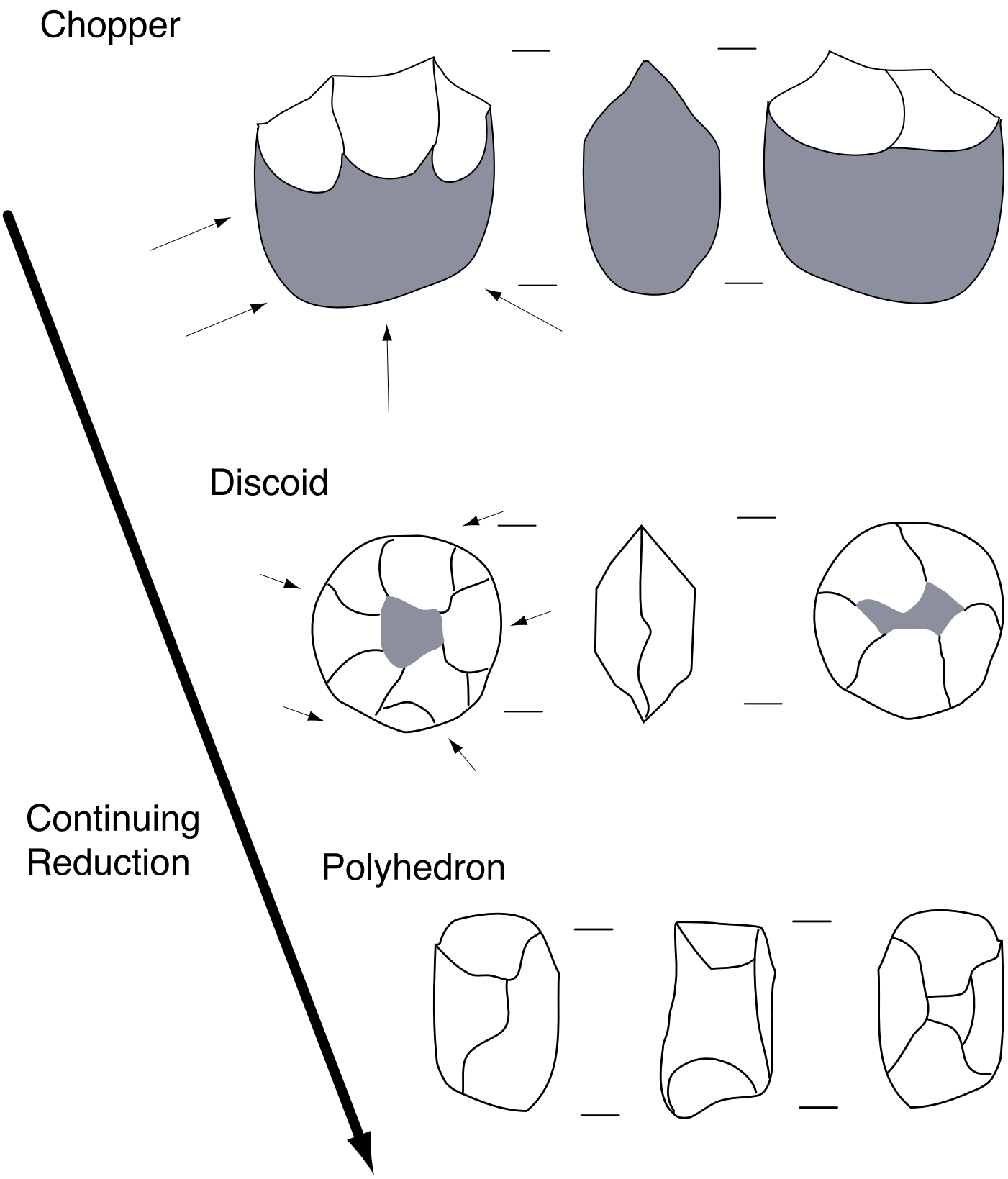

Figure 5. Chopper-discoid-polyhedron curation model.

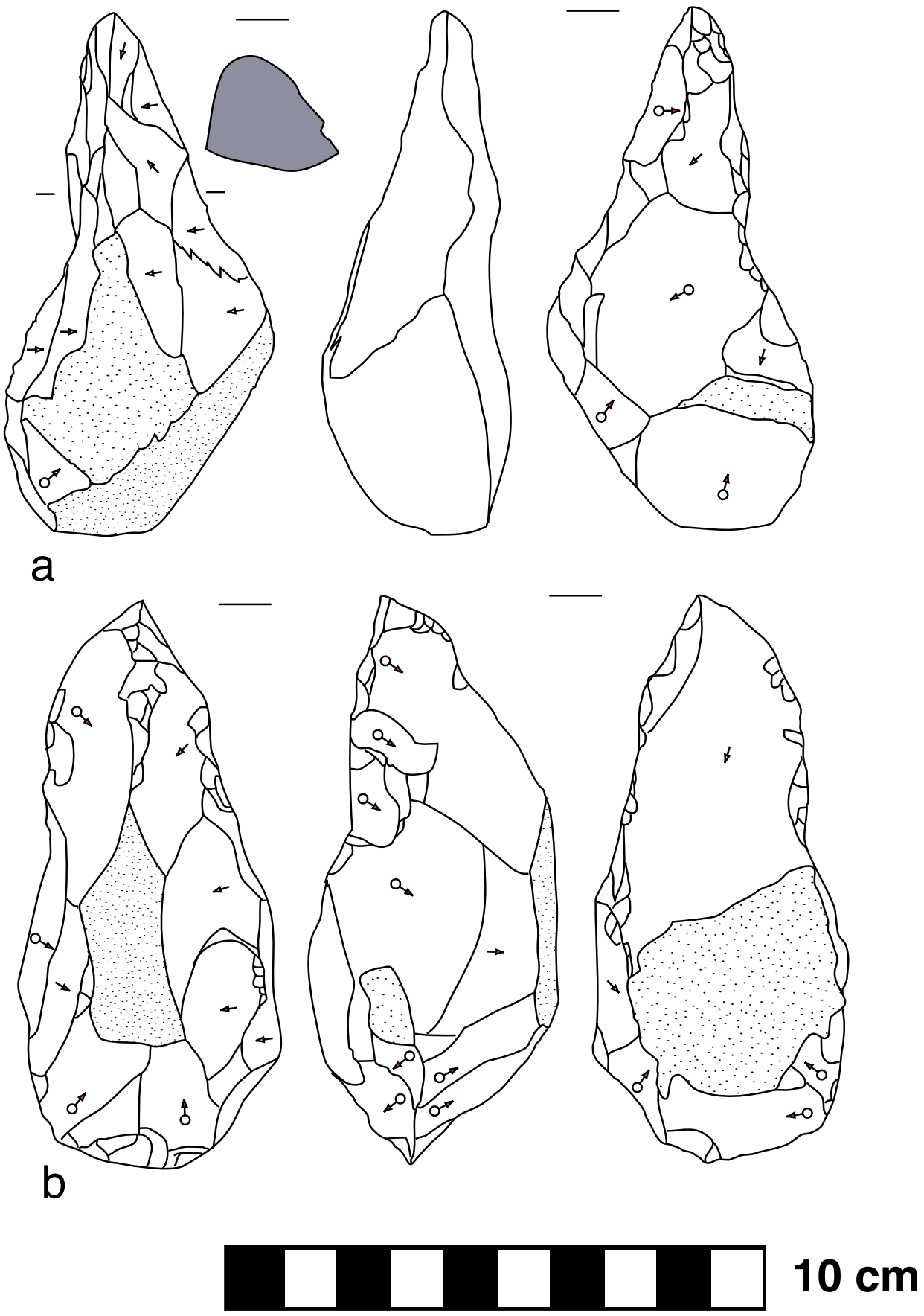

Figure 6. LCTs: Picks Sources: a. Ubeidiya (a), Latamne Quarry II (b). Redrawn after Bar-Yosef and Goren-Inbar (1993: 64), Clark (1967: 32).

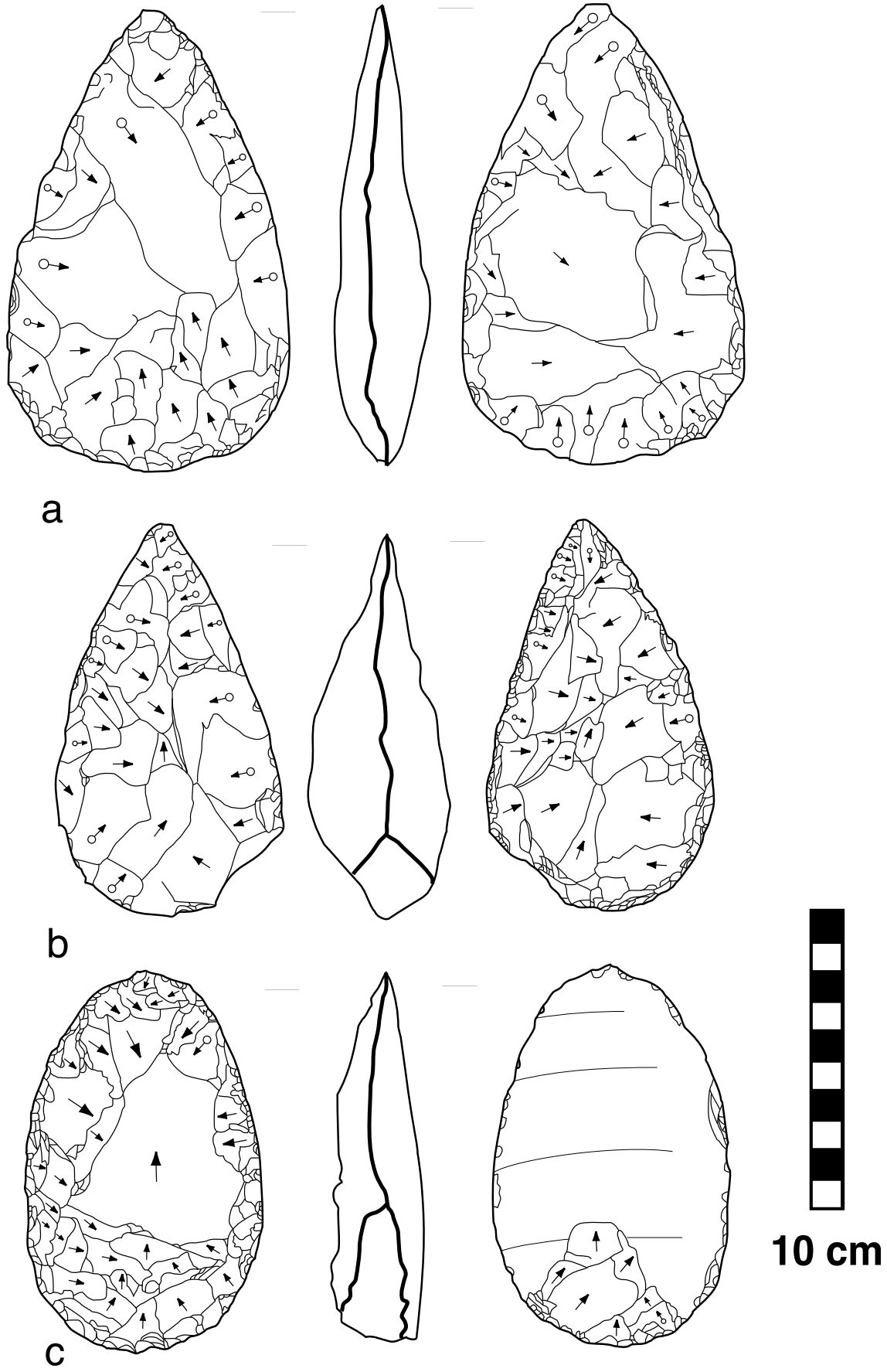

FIGURE 7. LCTs: Bifaces/handaxes (1 of 2). a. elongated cordiform biface, b. amygdaloid biface, c. ovate biface (on flake). Sources: a-c. Maayan Barukh (a-c). Redrawn after Stekelis and Gilead (1966).

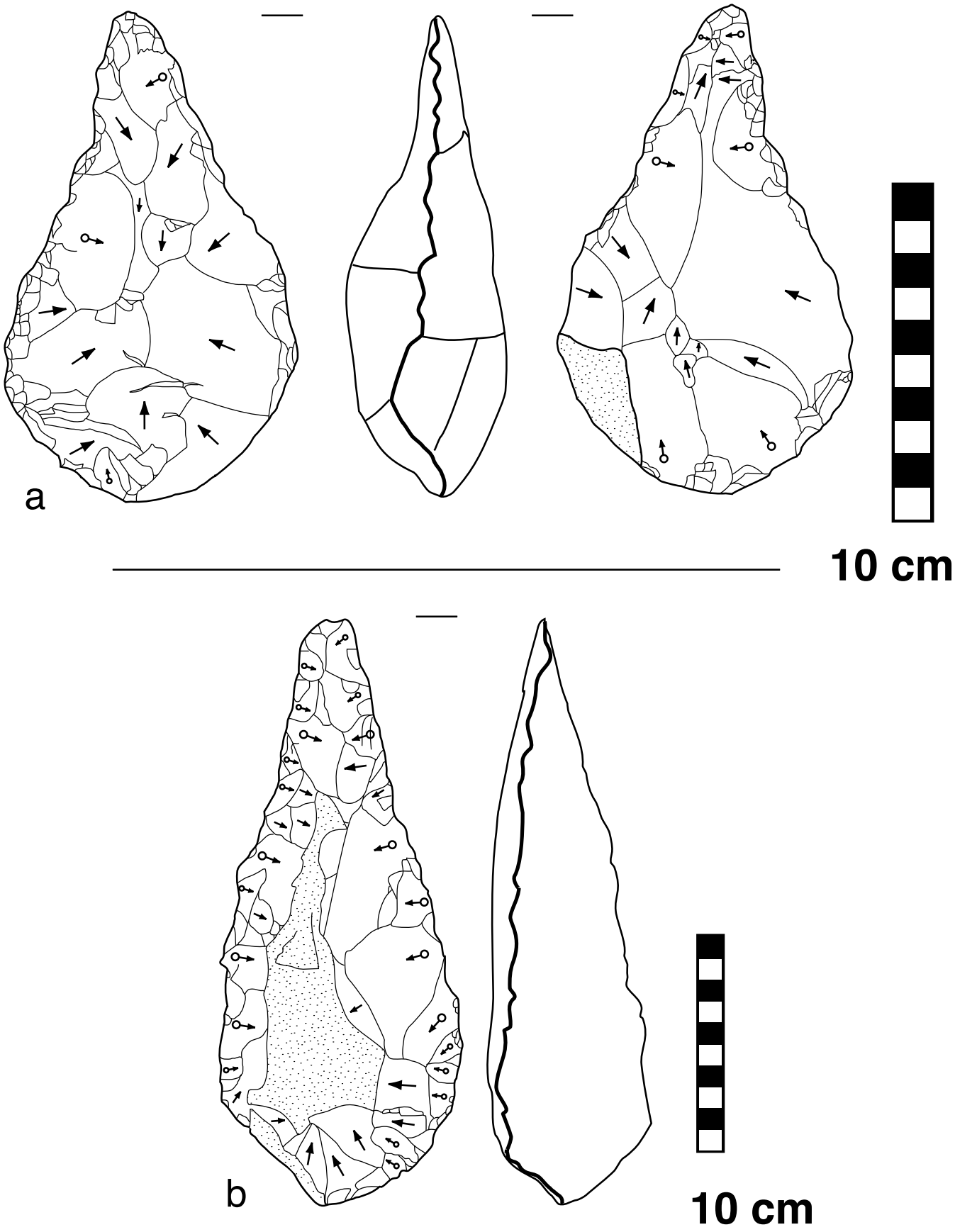

Figure 8. LCTs: Bifaces/handaxes (2 of 2). a. Micoquian biface, b. lanceolate biface. Sources: Maayan Barukh (a), b. Latamne (b). Redrawn after Stekelis and Gilead (1966), Clark (1967: 32).

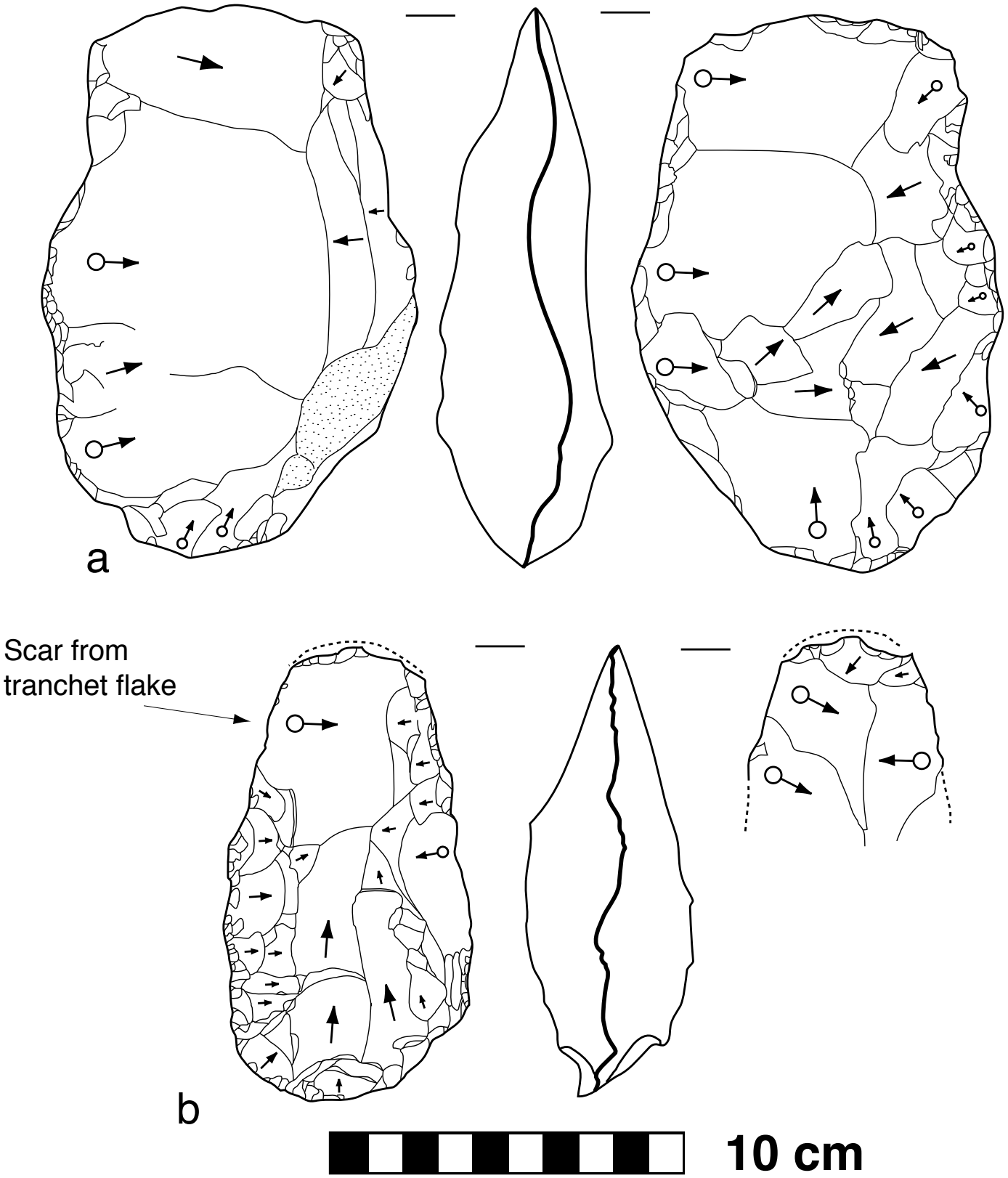

FIGURE 9. LCTs: Cleavers on cores. Sources: a. Maayan Barukh (a), Azraq Lion's Spring (b). Redrawn after Stekelis and Gilead (1966), Copeland (1989).

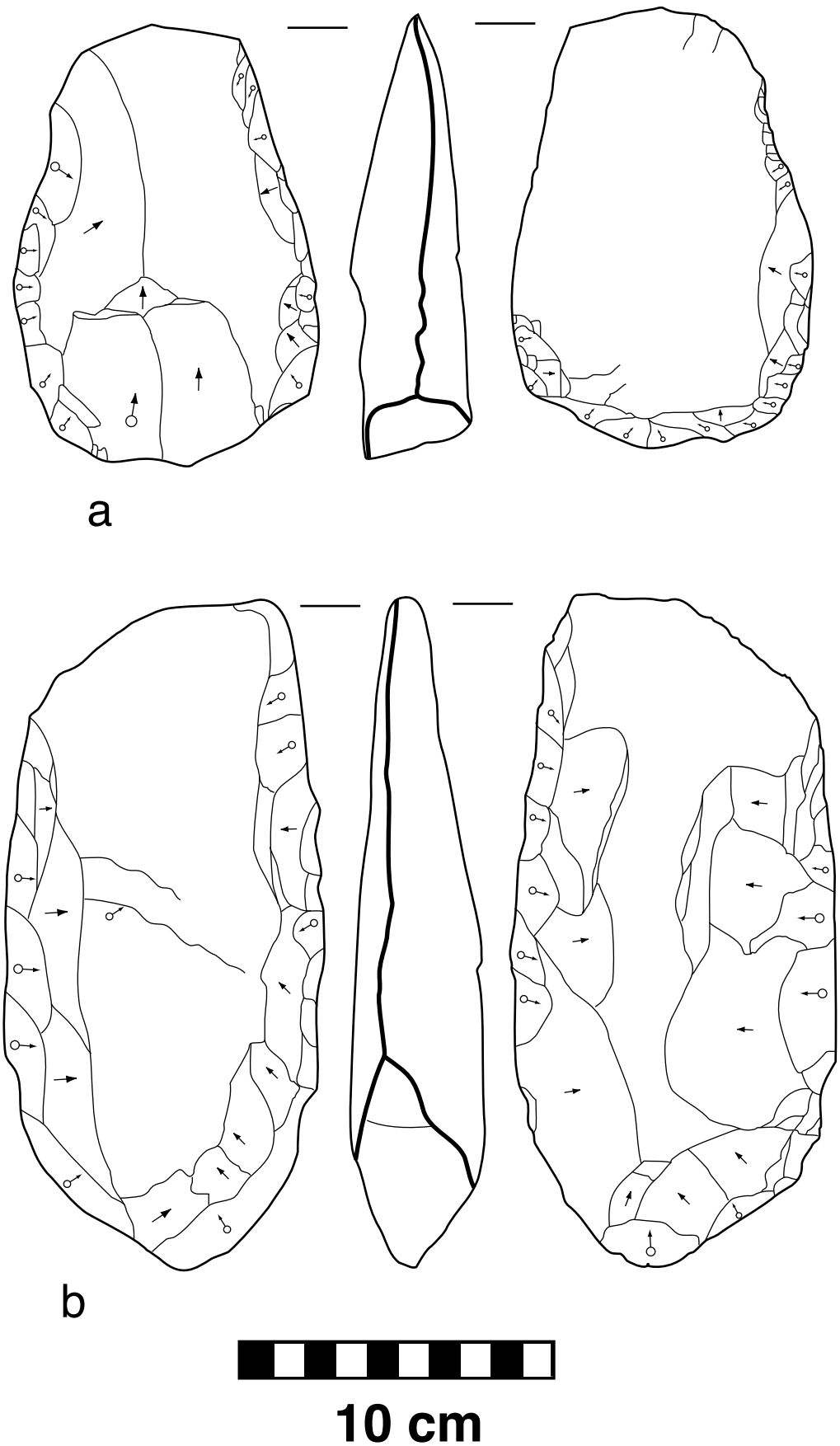

Figure 10. LCTs: Cleavers on large basalt flakes. Sources: Gesher Benot Yaacov (a-b). Redrawn after Goren-Inbar, et al. (1991), Goren-Inbar and Saragusti (1996).

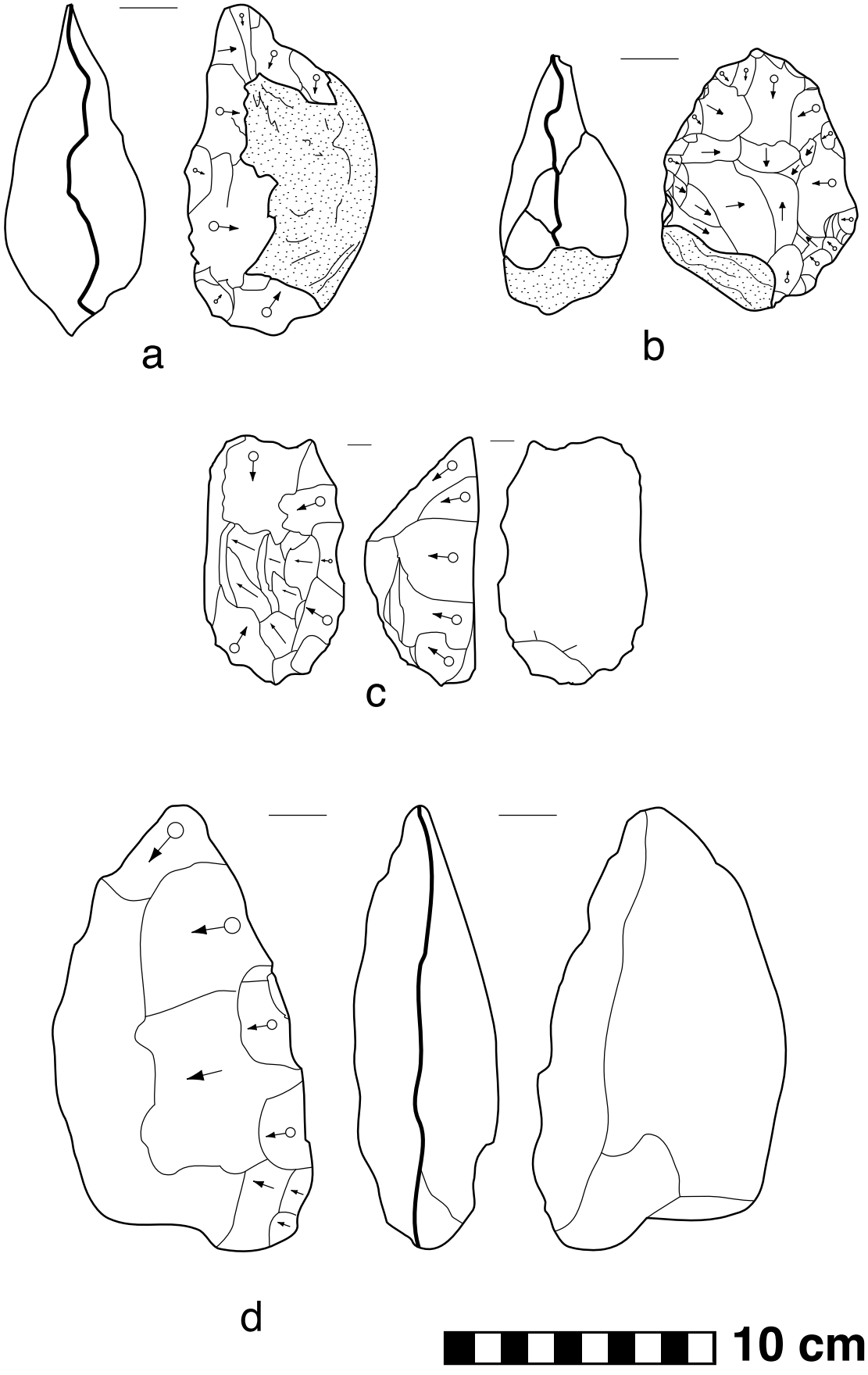

Figure 11. LCTs: a-b. Protobifaces, c-d. massive scrapers. Sources: a. Latamne (a), Maayan Barukh (b), Gesher Benot Ya'acov (c-d). Redrawn after Clark (1967), Stekelis and Gilead (1966), Goren-Inbar, et al. (2008: 706-707).

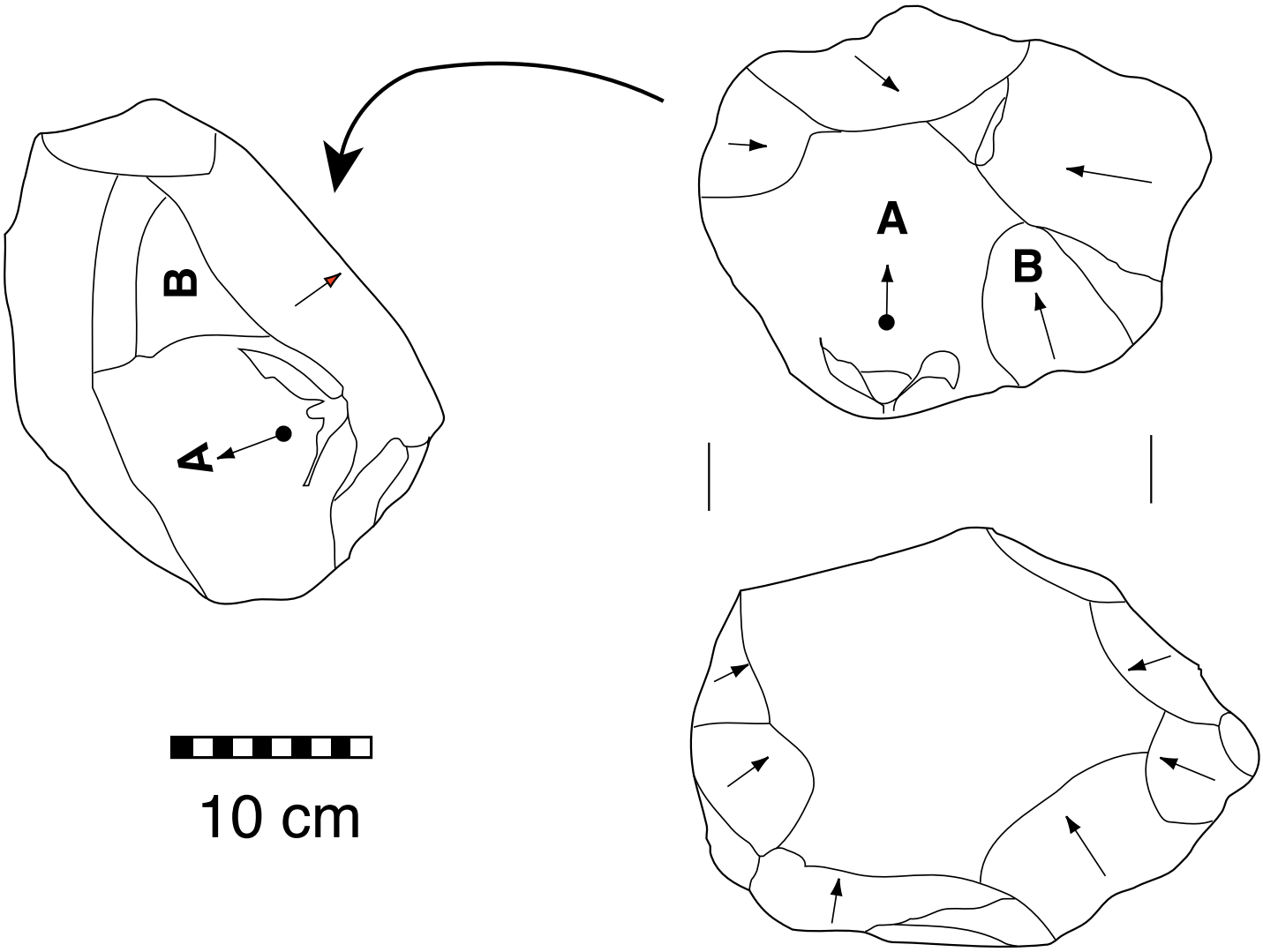

FIGURE 12. Acheulian "giant core". Source: Gesher Benot Ya'acov. Redrawn after Goren-Inbar, et al. (1994:105)

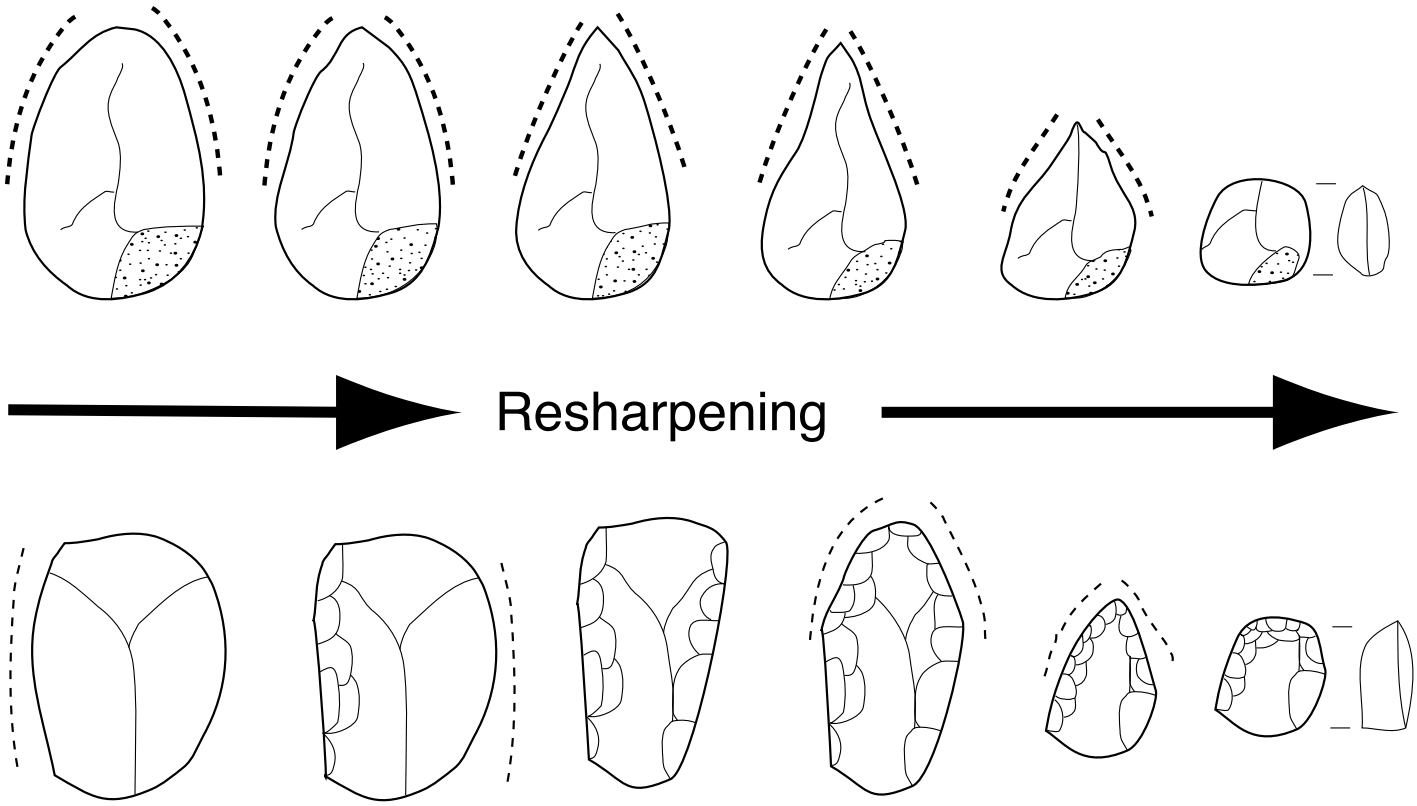

Figure 13. Lower Paleolithic LCT curation model.

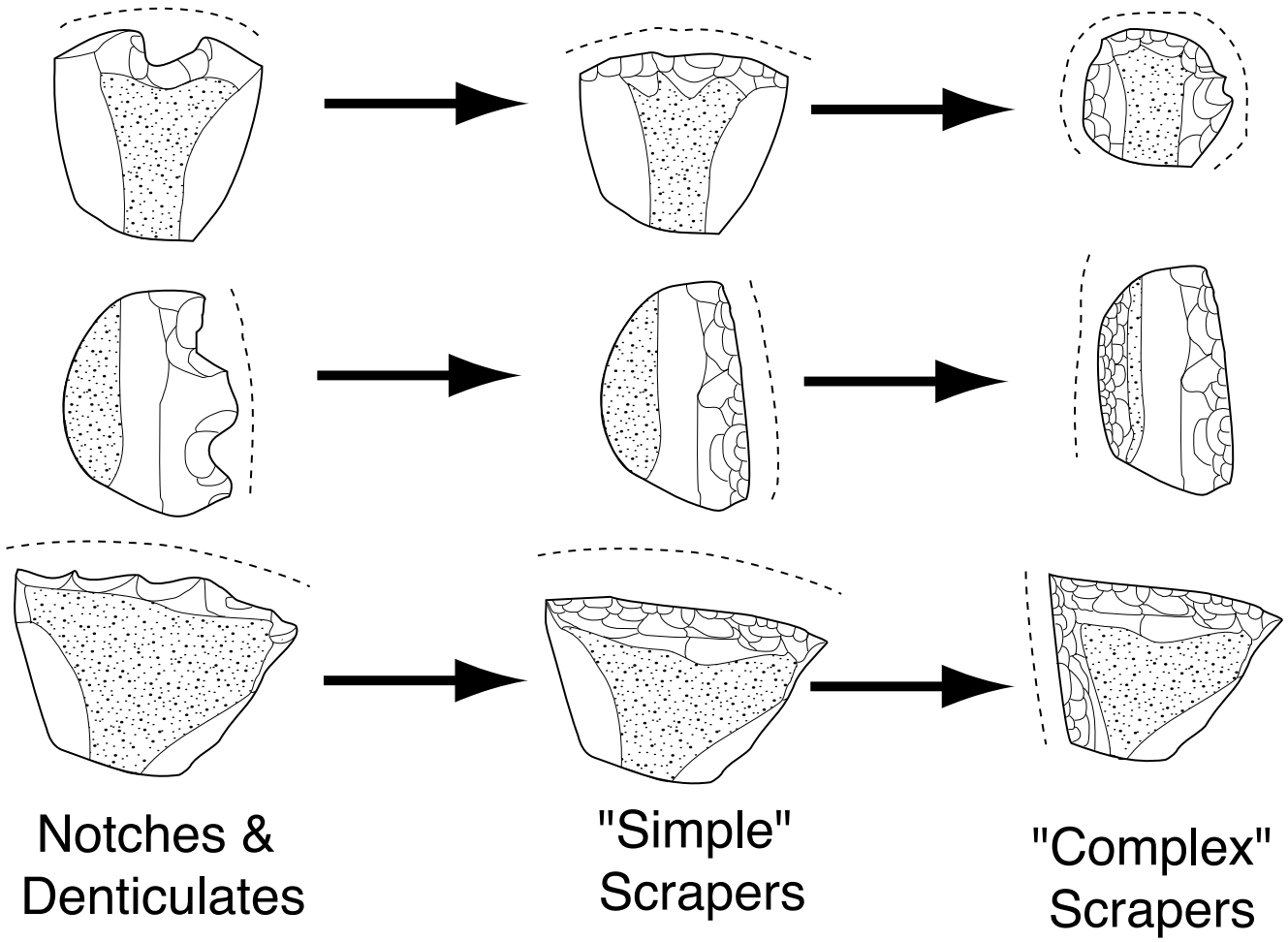

Figure 14. Lower Paleolithic retouched flake tools curation model

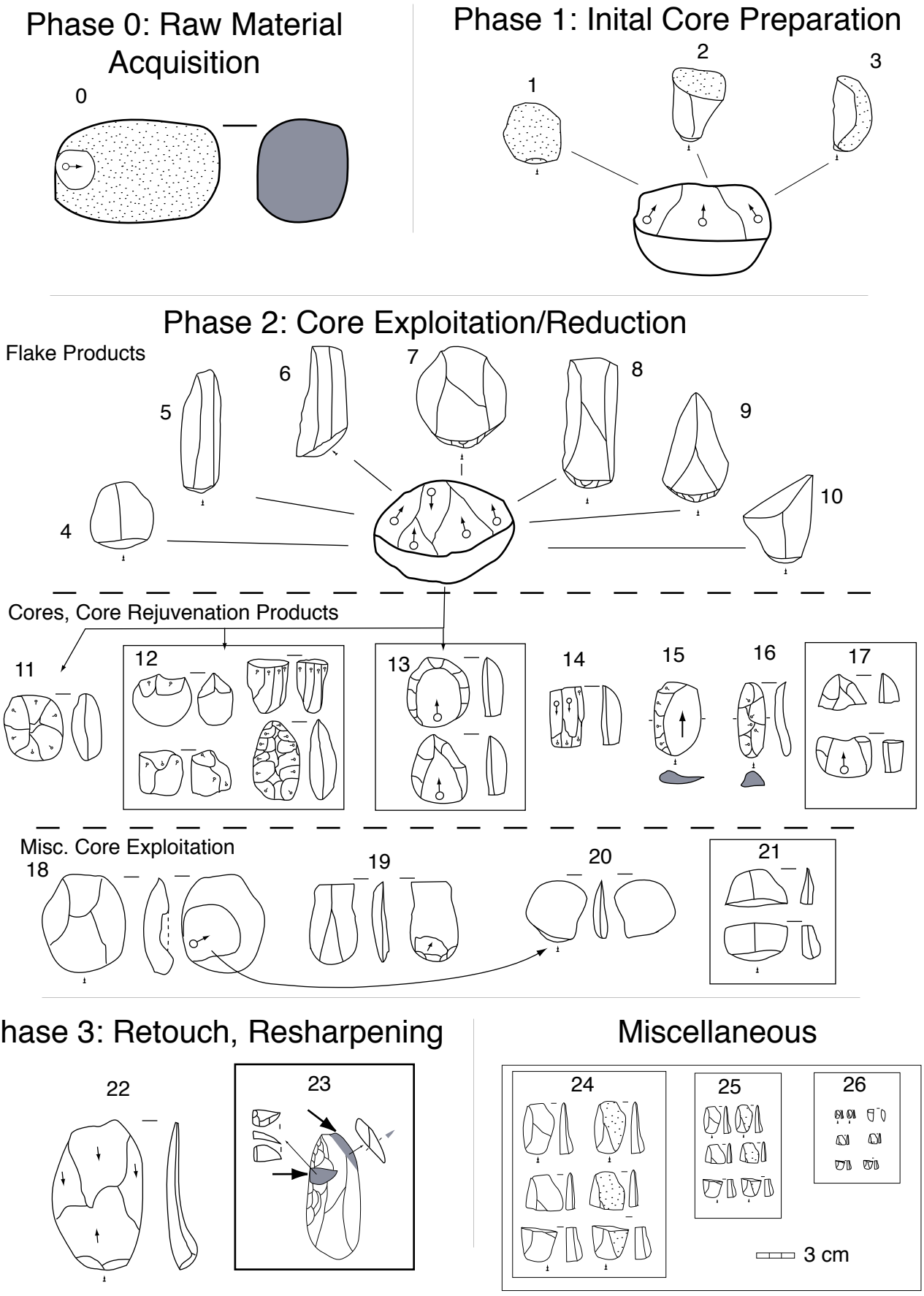

FIGURE 15. Geneste's *chaîne opératoire* typology.

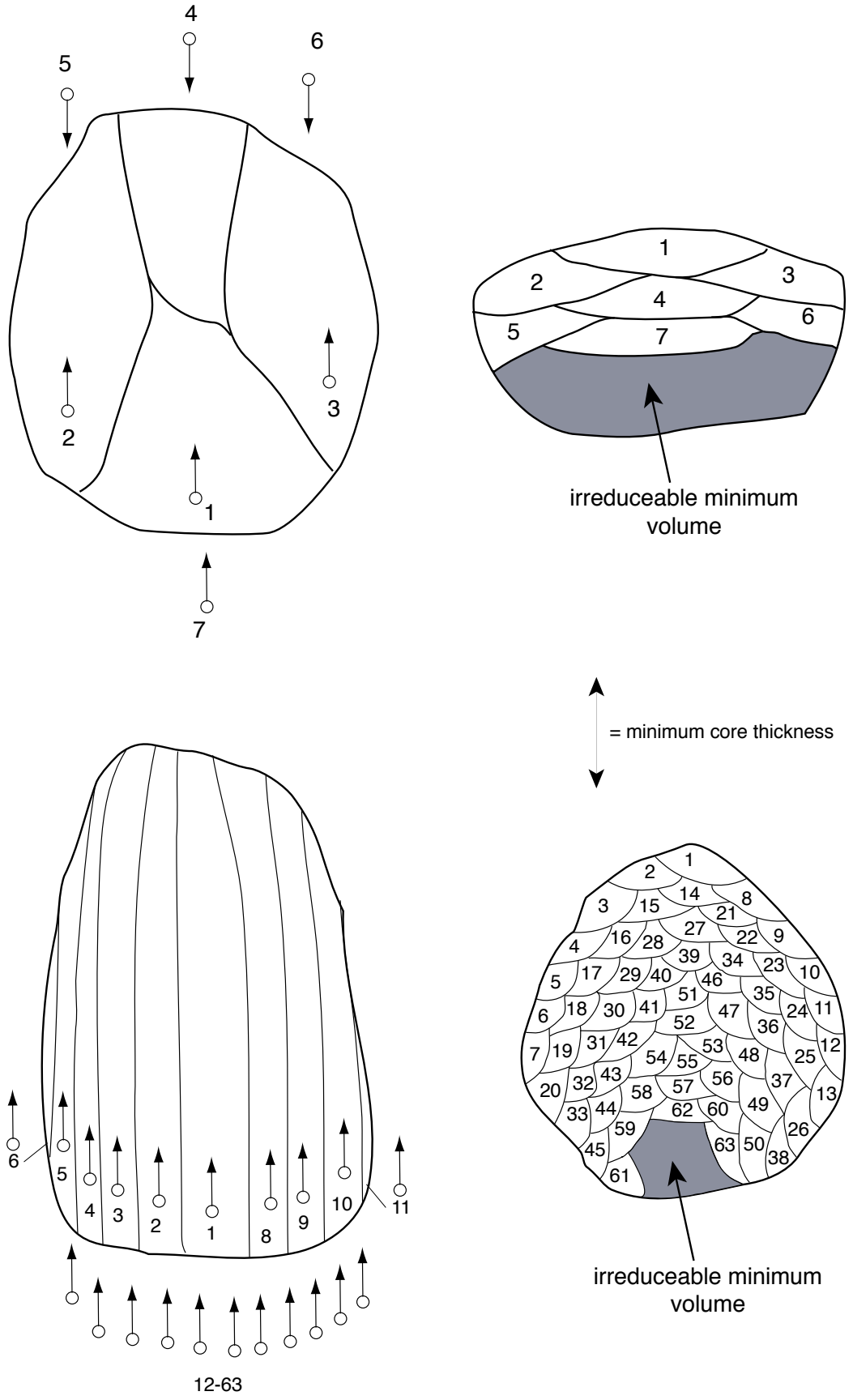

FIGURE 16. Schematic comparison of Levallois and prismatic blade cores.

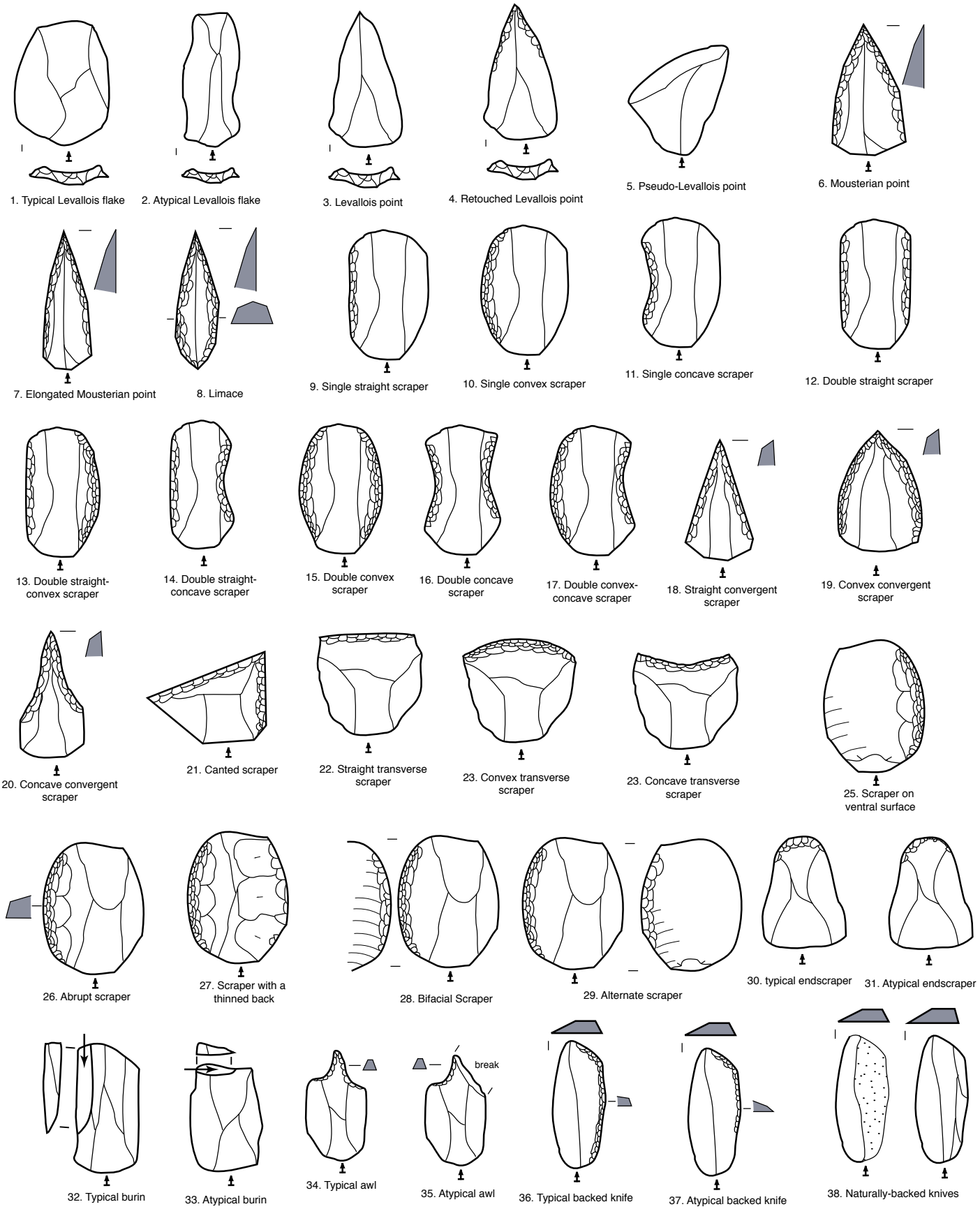

FIGURE 17. Schematic drawings of Bordes' types 1-38.

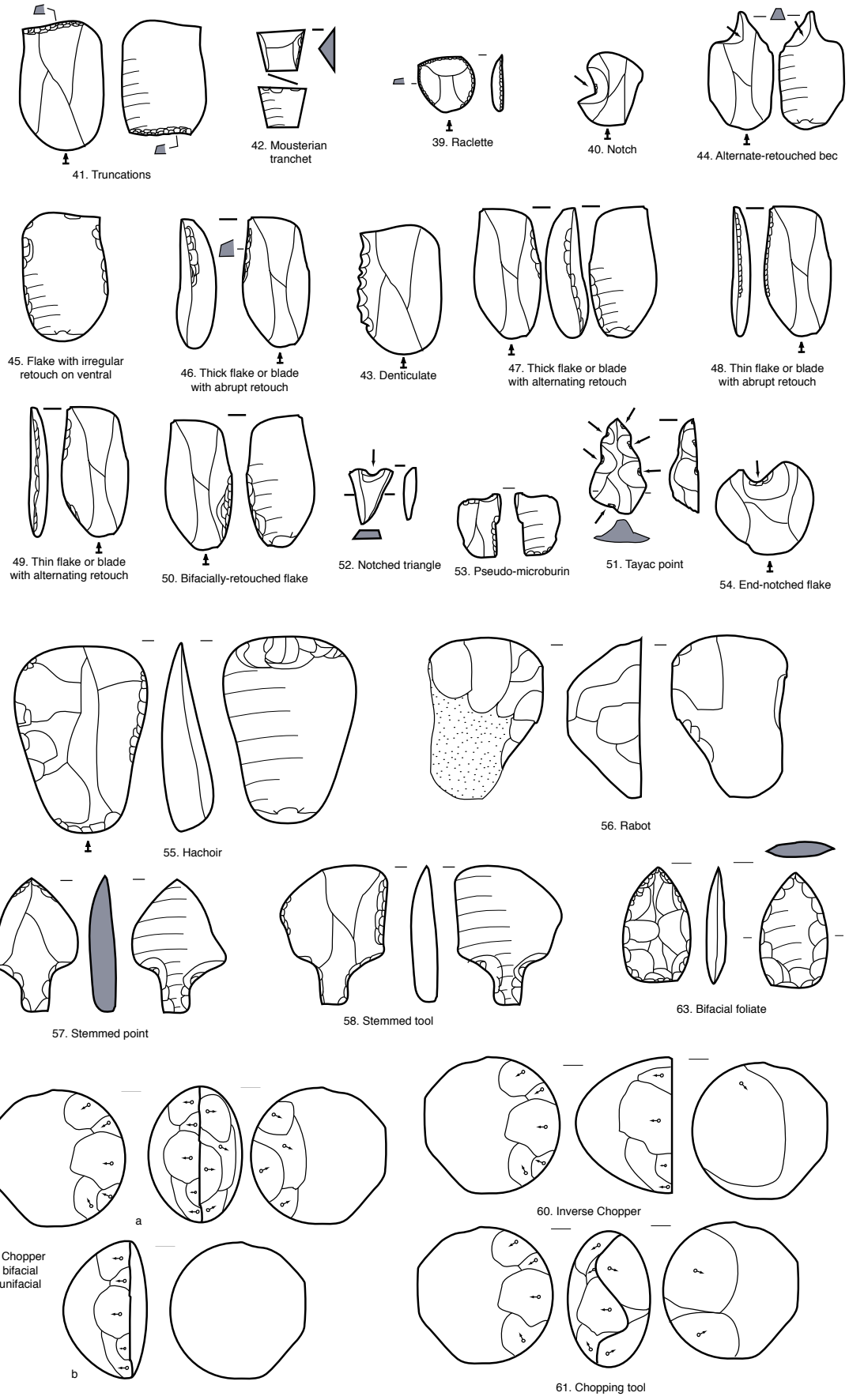

FIGURE 18. Schematic drawings of Bordes' types 39-63.

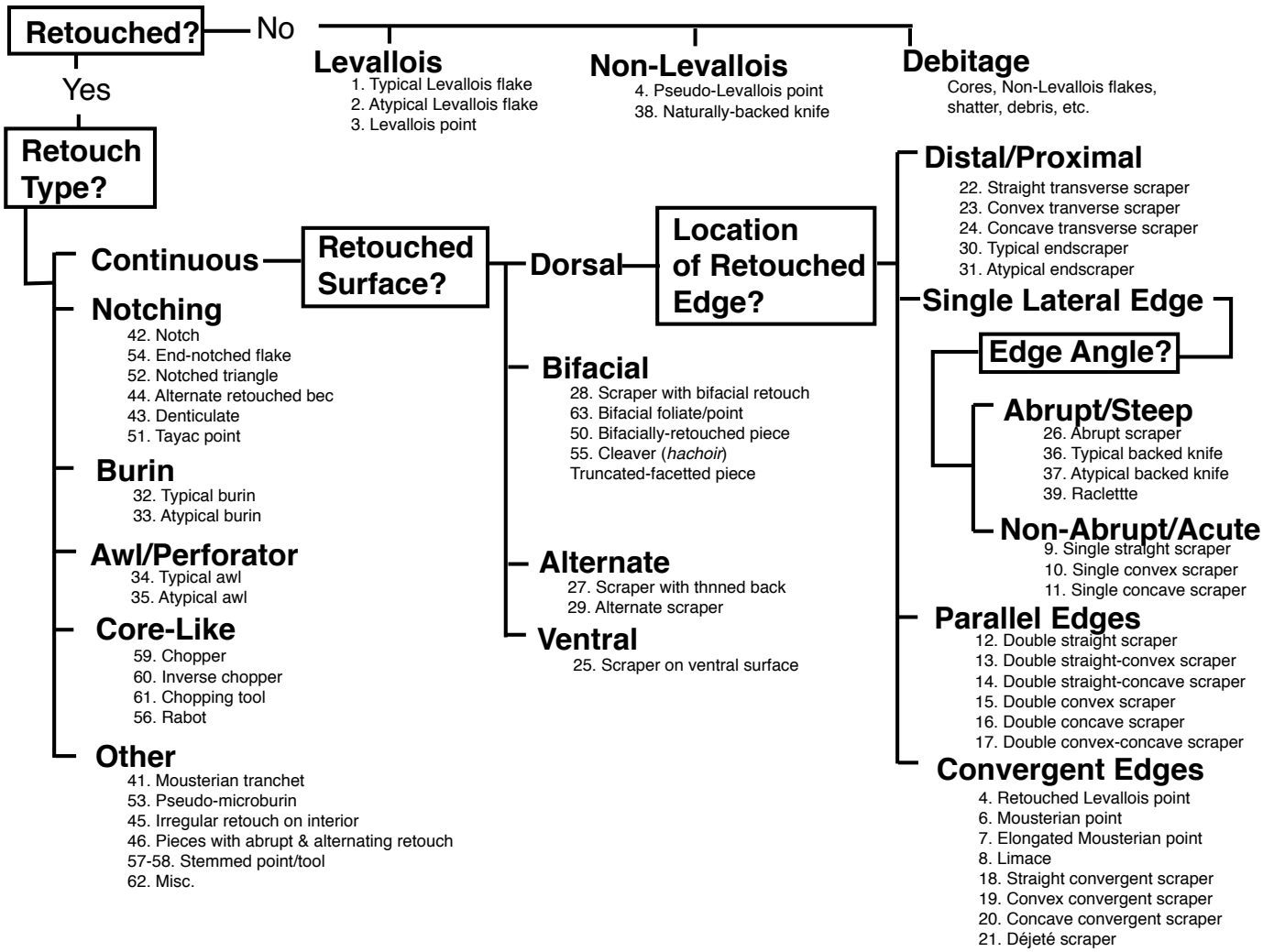

FIGURE 19. Flow chart showing steps involved in classifying stone tools in Bordian typology

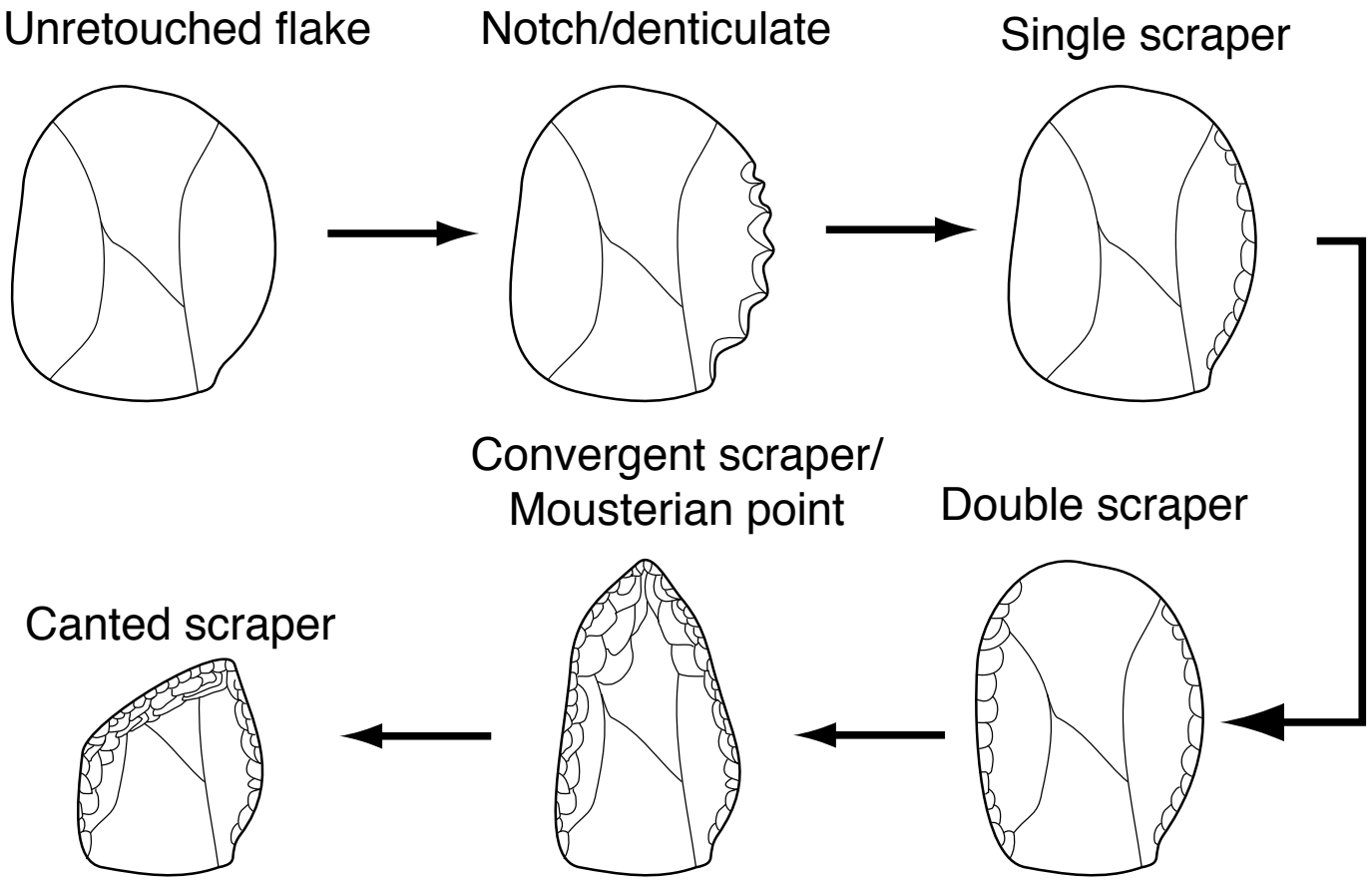

Figure 20. Middle Paleolithic scraper resharpening model.

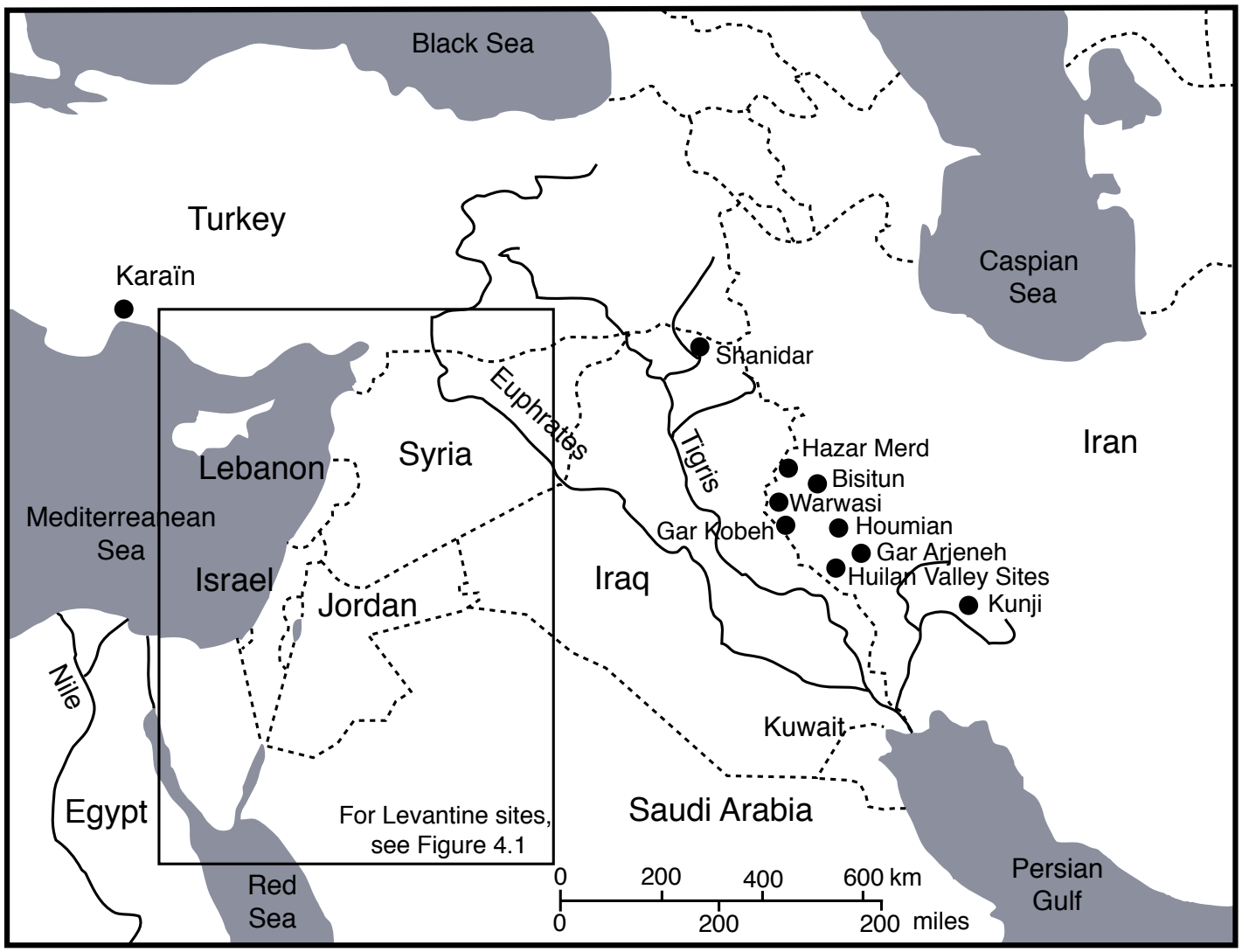

FIGURE 21. Map showing locations of Montane Mousterian sites.

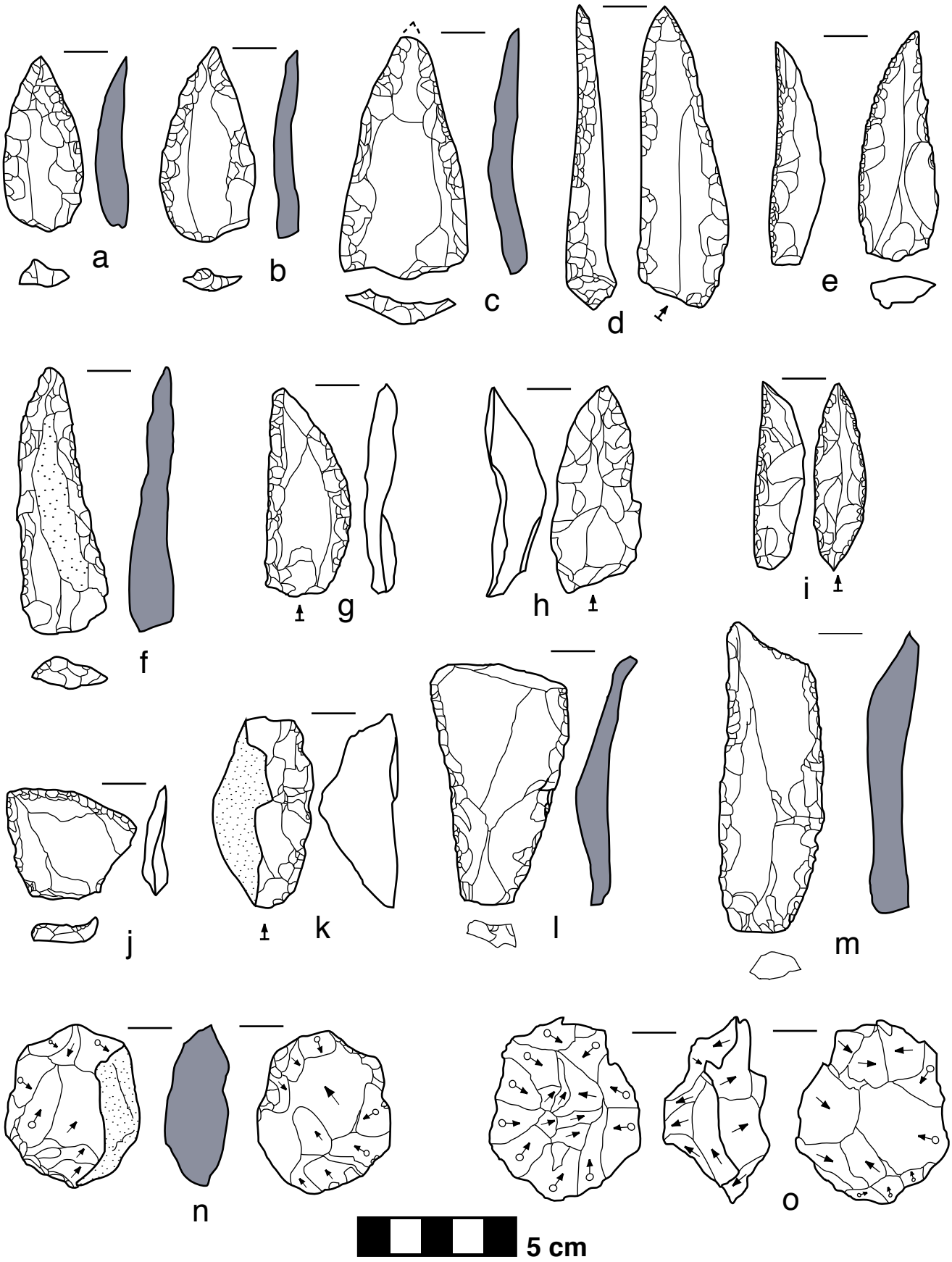

FIGURE 22. Montane Mousterian artifacts. a-b. Mousterian points, c-e. elongated Mousterian points, f-g. convergent scrapers, h-i. limaces, j. canted scraper, k. single sidescraper, l-m. double scrapers, n. core-on-flake, m. discoidal core. Sources: Kunji Cave (a-c, f, j, l-m), Warwasi Cave (d), Shanidar Cave Level L (e, i), Karain Cave (g, h, k, o), l-m. Kunji Cave. Redrawn after Baumler and Speth (1993), Dibble and Holdaway (1993), Solecki and Solecki (1993), Bar-Yosef (2000).

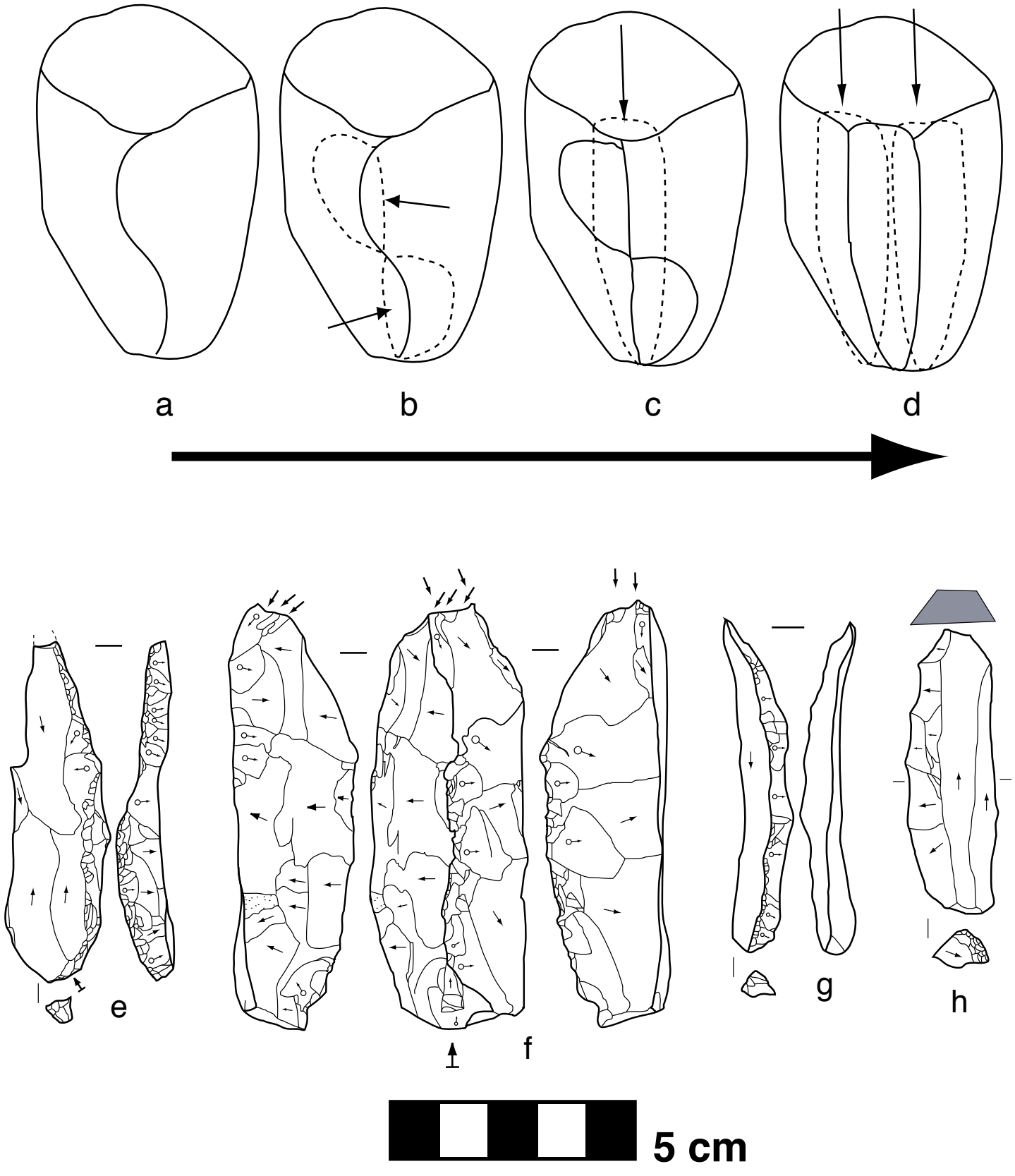

Figure 23. Upper Paleolithic blade-core-trimming elements: Crested blades and initiation of prismatic blade core reduction. a. Unmodified block, b. Creation of the crest by orthogonal flaking, c. Removal of crested blade, d. removal of guiding blades, e. asymmetrical crested blade, f. crested blade with multiple burin scars at distal end, g. crested blade, h. secondary crested blade. Sources: Boker Tachtit Level 1 (e), Boker Tachtit Level 2 (f), Ksar Akil Level XXII (g-h). Redrawn after Marks (1983), Ohnuma (1989).

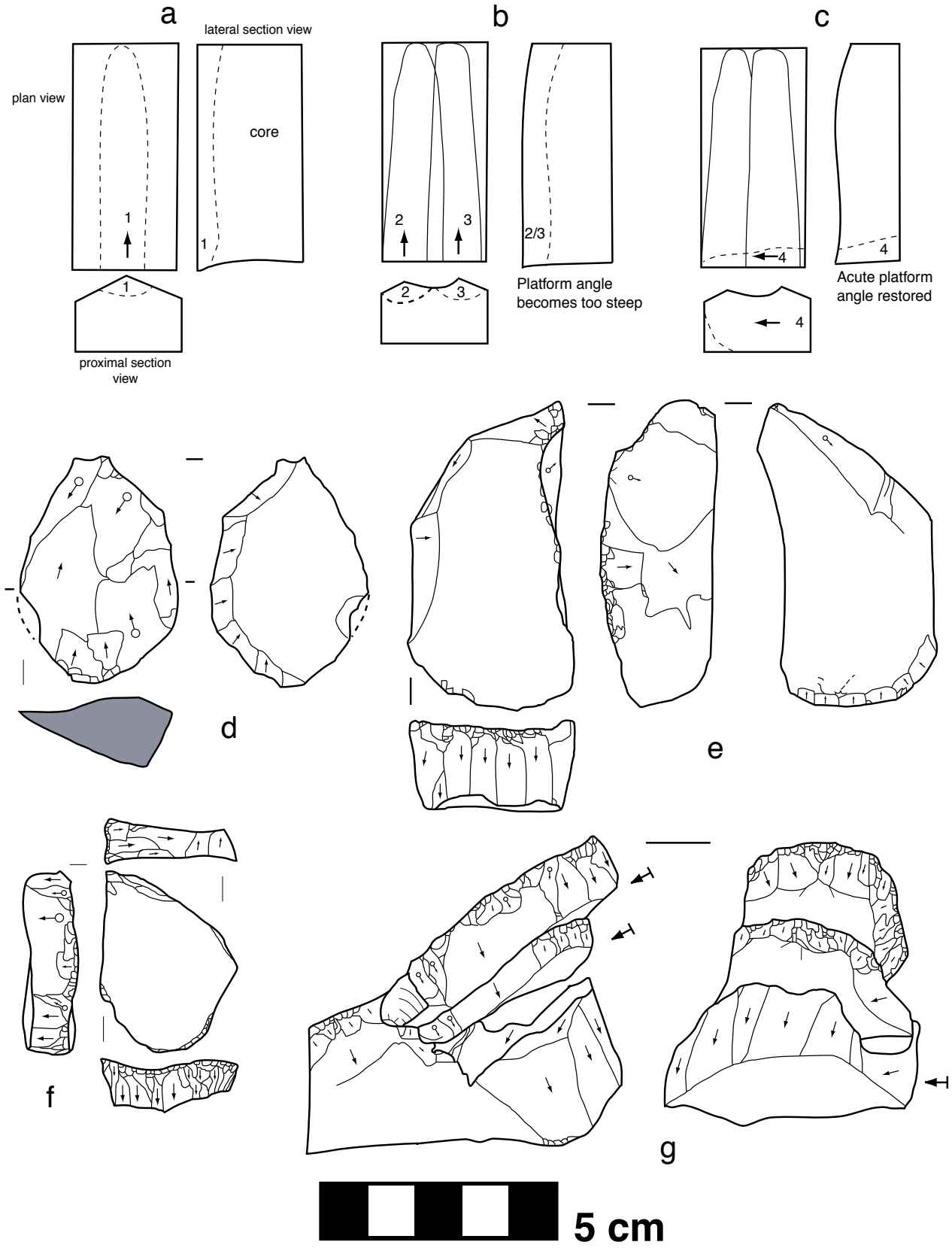

FIGURE 24. Upper Paleolithic blade-core-trimming elements: Platform retreat and core tablet flakes. a-c. Schematic diagram showing core tablet flake as a solution to platform retreat. a. Initial blade detached from concave striking platform. b. Successive blades cause the edge of the striking platform to retreat into the platform concavity, creating a platform angle close to 90, and making further blade removals difficult. c. Detachment of a core tablet flake restores an acute striking platform angle. d-f. core tablet flakes, g. refitting set of core tablet flakes. Note: d-f were modified into burins. Sources: Ksar Akil Level XXI (d), Boker Area A (e-g). Redrawn after Marks (Marks 1977), Monigal (2003), Ohnuma (1989).

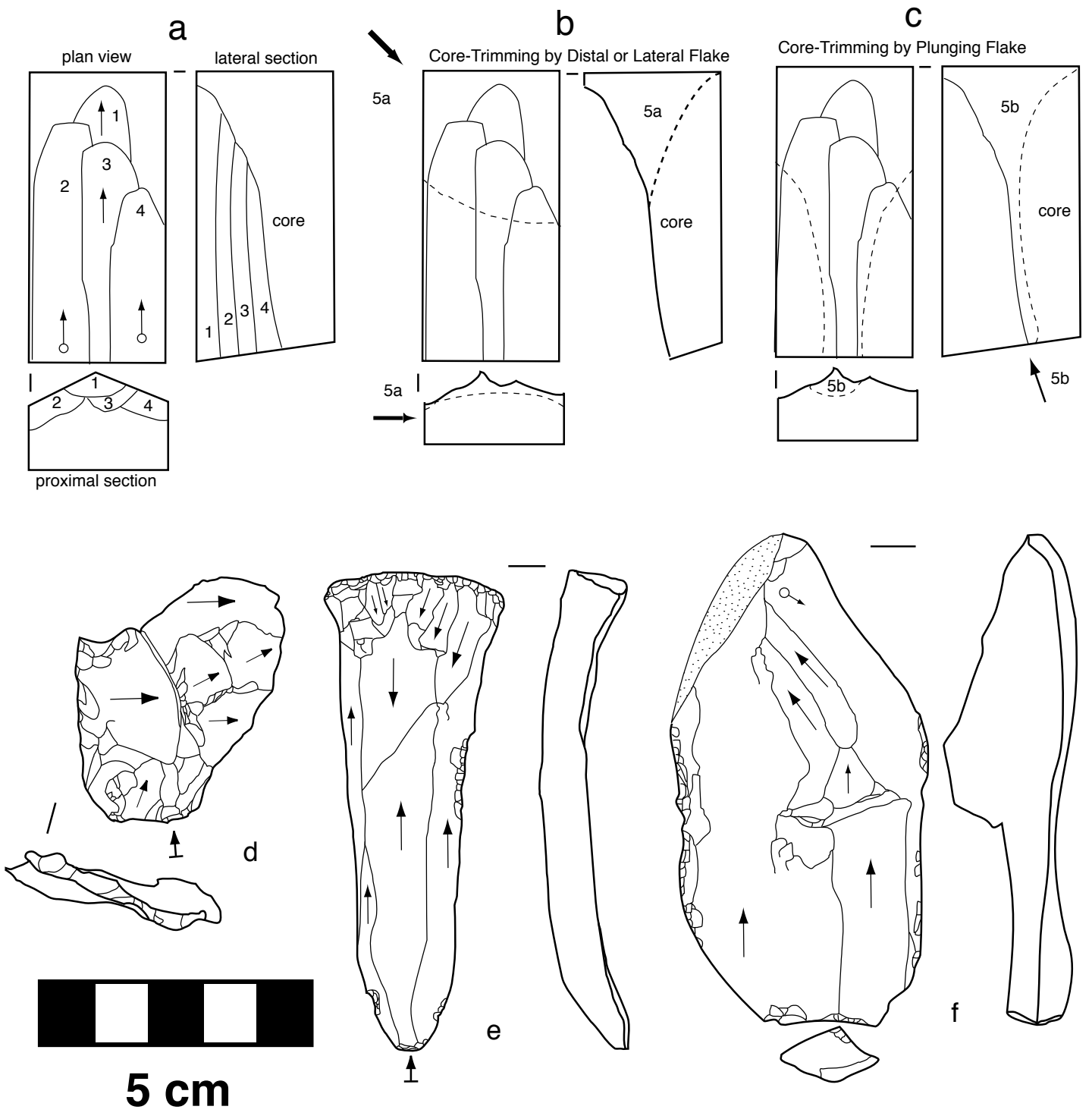

FIGURE 25. Upper Paleolithic blade-core-trimming elements: Short termination and the creation of distal core-trimming elements and plunging flakes/blades. a. Successively shorter blade removals (1–4) create a convexity at the distal end of the flake release surface that obstructs further blade removals. b. Distal convexity removed by a lateral or distal flake (5a). c. Distal convexity removed by a plunging/overshot blade (5b), d. lateral core-trimming flake, e. plunging blade, f. plunging flake. Sources: Ksar Akil Level X (d), Boker Tachtit Level 1 (e) Boker Tachtit Level 4 (f). Redrawn after Bergman (1987), Marks (1983, 1977).

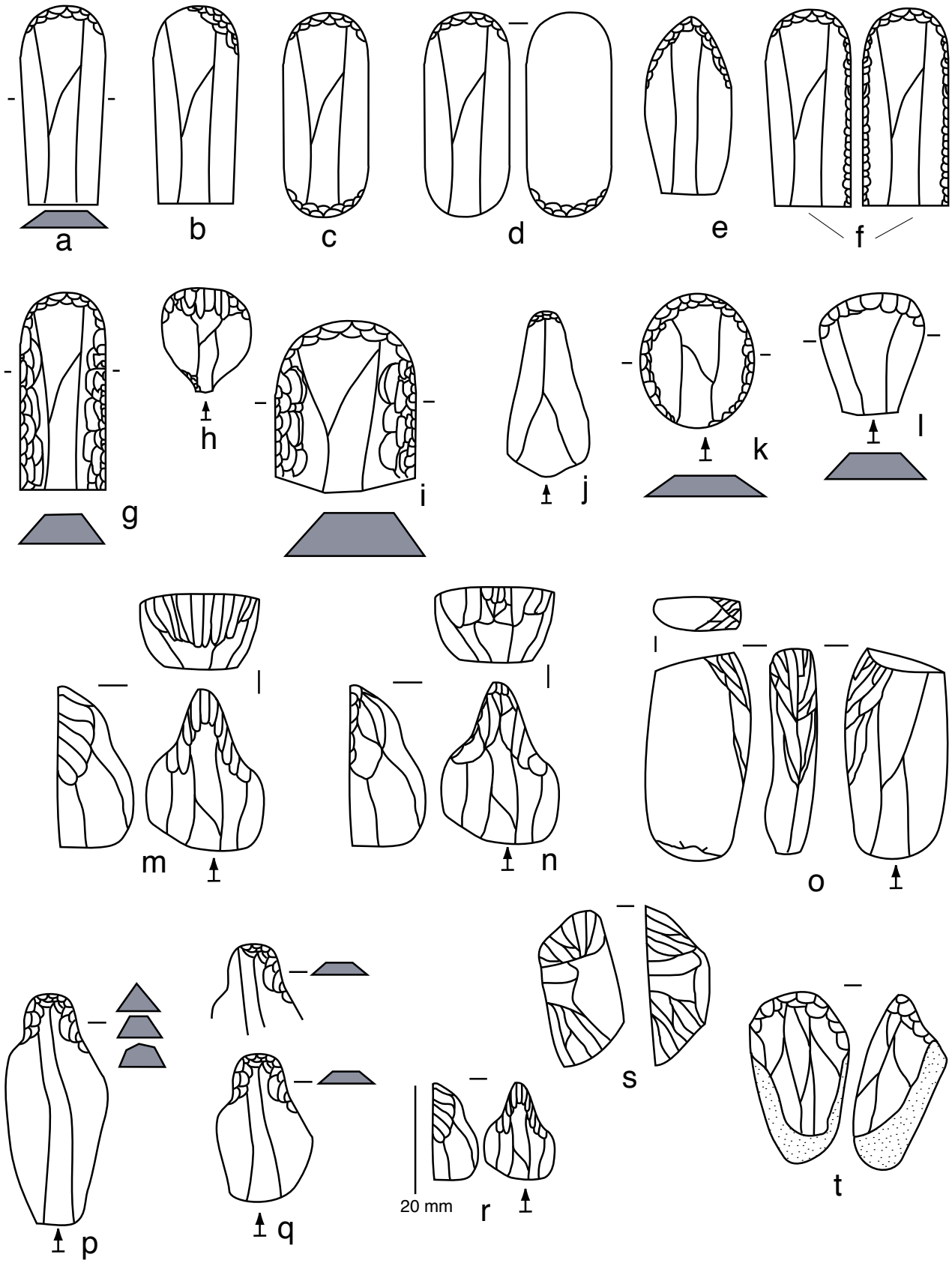

FIGURE 26. Schematic diagrams of Upper Paleolithic endscraper types: a. Single endscraper, b. Atypical endscraper, c. Double flat endscraper, d. Alternate flat endscraper, e. Ogival endscraper, f. Endscraper on retouched blade, g. Endscraper on Aurignacian blade, h. Fan-shaped endscraper , i. Flake scraper, j. Endscraper on a Levallois point, k. Circular (end)scraper , l. Thumbnail endscraper , m. Carinated endscraper, n. Atypical carinated endscraper, o. Lateral carinated endscraper, p. Thick-nosed endscraper, q. Flat-nosed or shouldered endscraper, r. Micro-carinated endscraper, s. Multiple carinated endscraper, t. Thick endscraper on a core ("rabot").

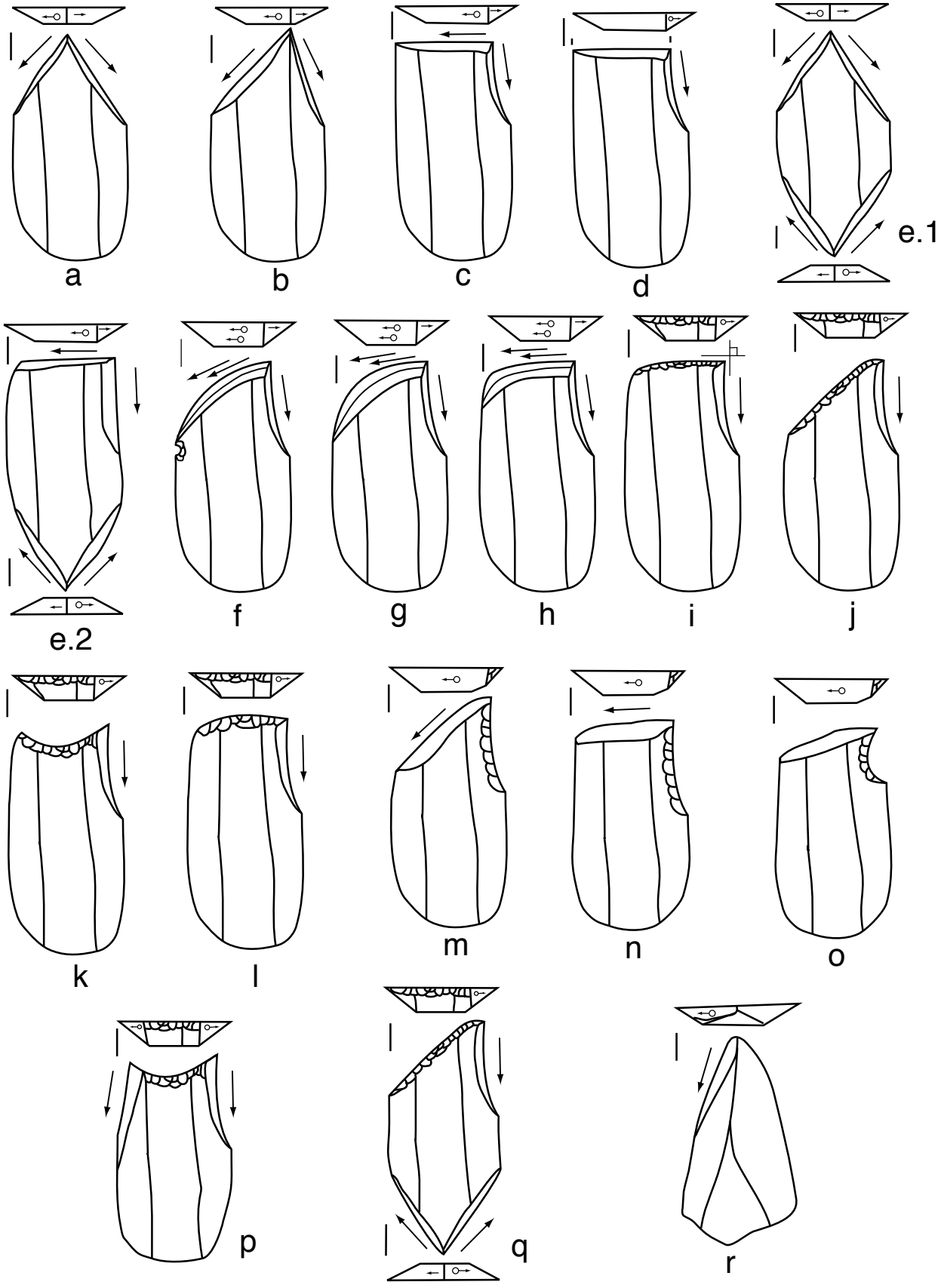

FIGURE 27. Schematic diagrams of Upper Paleolithic burin types. a. Straight dihedral burin, b. Offset dihedral burin, c. Angle dihedral burin, d. Angle dihedral burin on break, e. Multiple dihedral burin, f. Beaked burin, g. Carinated burin, h. Flat-faced carinated burin, i. Right angle straight truncation burin, j. Oblique straight truncation burin, k. Burin on a concave truncation, l. Burin on a convex truncation, m. Oblique burin on a lateral preparation, n. Transverse burin on a lateral preparation, o. Transverse burin on a notch, p. Multiple burin on a truncation, q. Mixed multiple burin, r. Burin on a Levallois point.

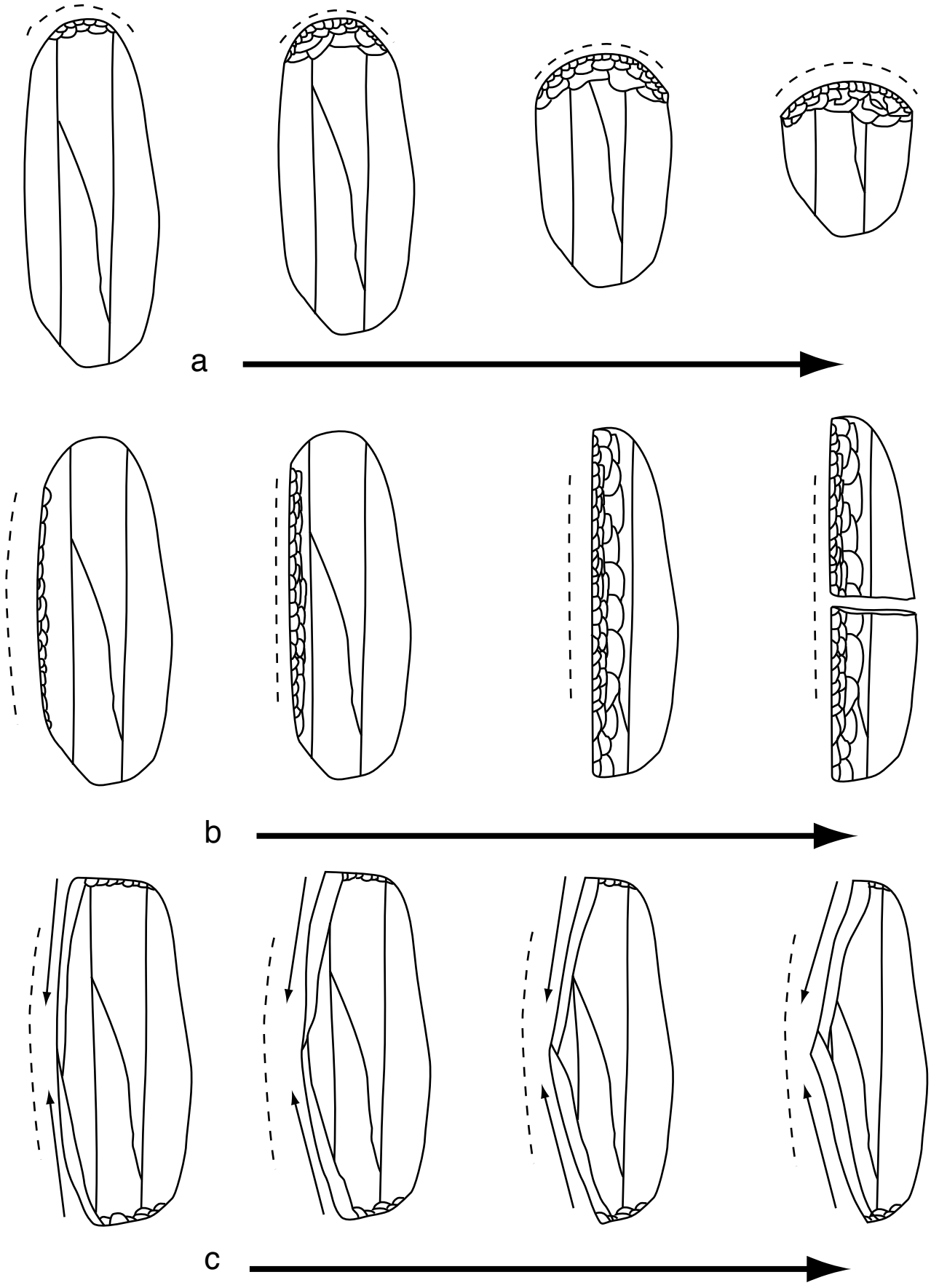

FIGURE 28. Retouch curation of blades: a. distal retouch, b. lateral retouch, c. burination.

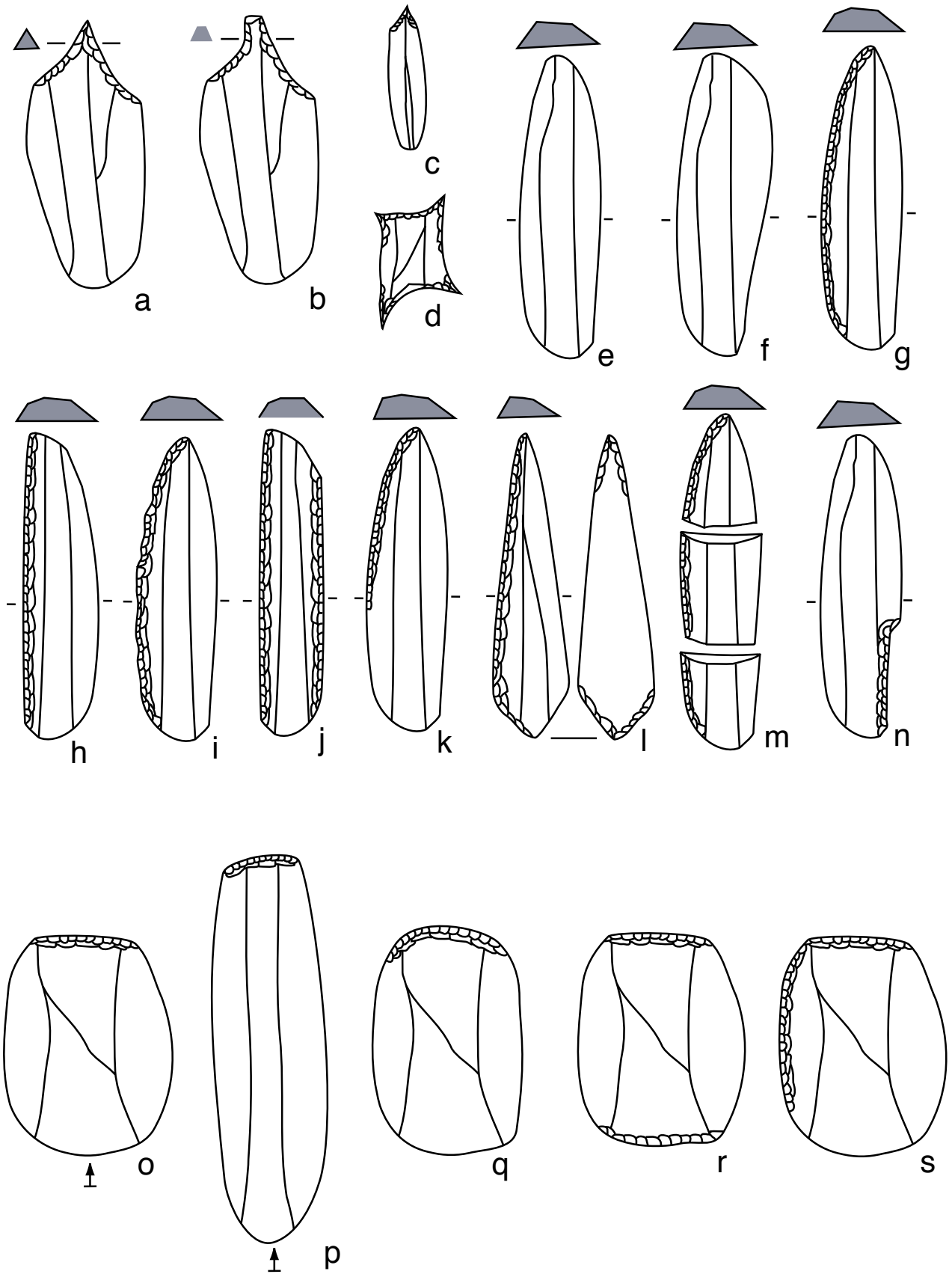

Figure 29. Schematic diagrams of common Upper Paleolithic retouched tools. perforators, backed knives, truncations. a. Typical perforator (Perforator, Curved perforator), b. Atypical perforator (spike, bec), c. Micro-perforator, d. Multiple perforator, e. Naturally-backed knife, f. Atypical backed knife, g. Knife with a curved back, h. Knife with a straight back, i. Piece with an irregular back, j. Piece with two backed edges, k. Partially-backed piece, l. Backed point (aka Falita point), m. Backed fragment, n. Shouldered piece, o. Truncated flake, p. Truncated blade, q. Piece with curved truncation, r. Bitruncated piece, s. Backed and truncated piece.

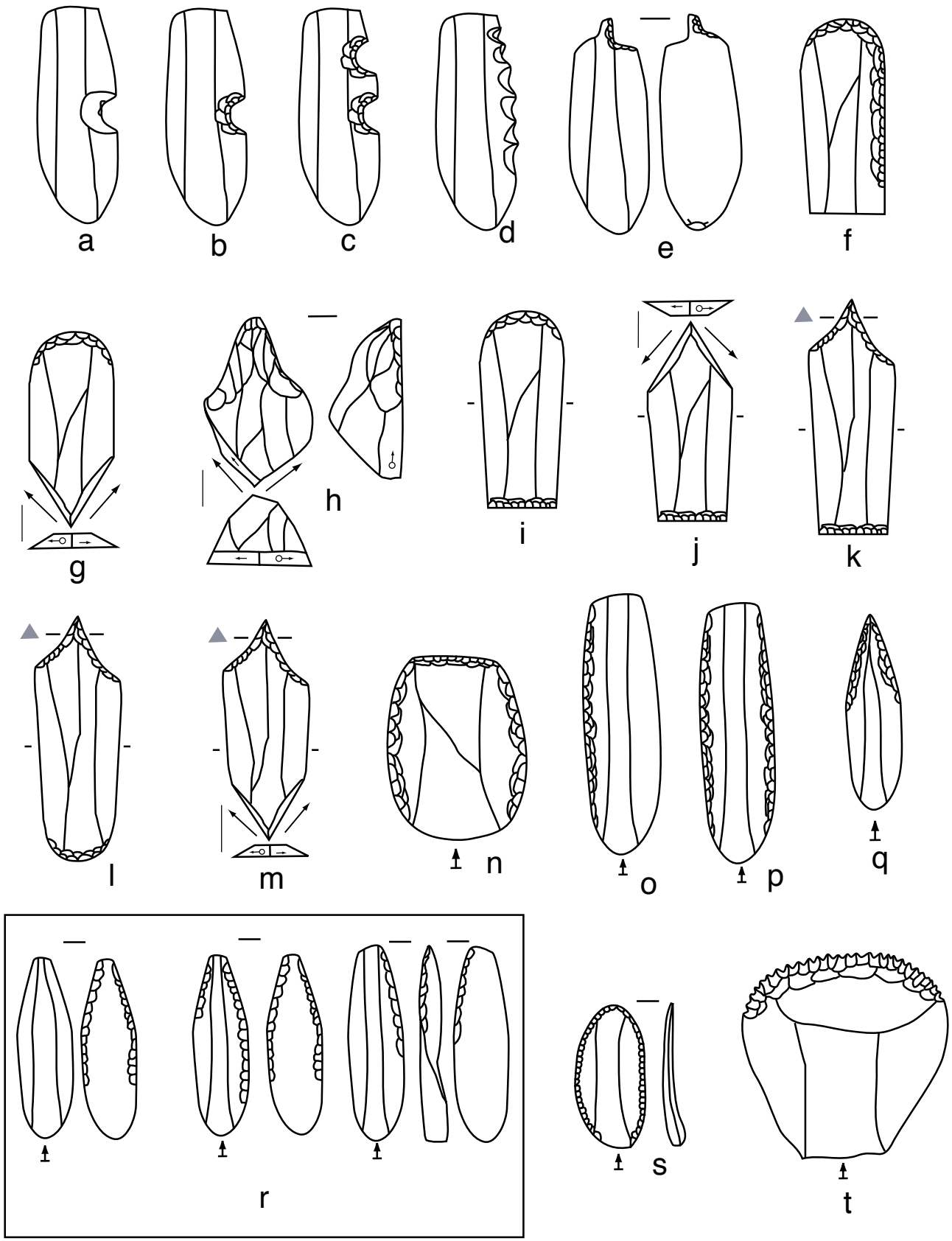

FIGURE 30. Schematic diagrams of common Upper Paleolithic retouched tools. notches & denticulates, combination pieces, miscellaneous retouched tools. a. Clactonian notch, b. retouched notch, c. blade or bladelet with multiple notches, d. denticulate, e. alternate burinated be, f. endscraper/sidescraper, g. endscraper/burin, h. carinated endscraper-burin, i. endscraper/truncated piece, j. burin-truncated piece, k. perforator-truncated piece, l. perforator-endscraper, m. perforator-burin, n. flake with continuous retouch, o. blade with continuous retouch on one edge, p. blade with continuous retouch on both edges, q. pointed piece, r. piece with inverse or alternate retouch (includes Dufour bladelet), s. raclette, t. denticulated scraper (Ksar Akil scraper)

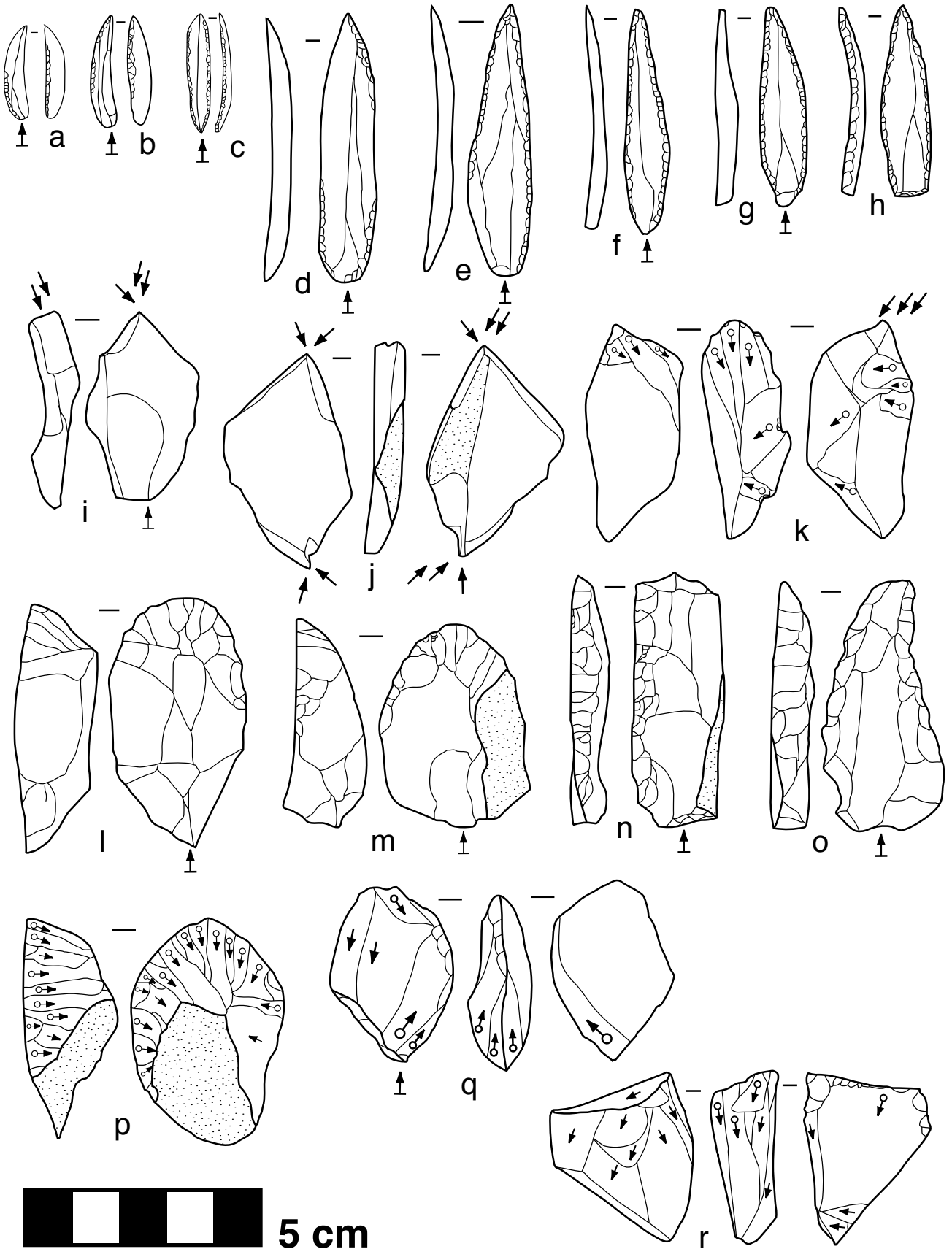

FIGURE 31. Characteristic artifacts of Baradostian assemblages. a-c. Dufour bladelets, d-h. El Wad points, i-j multiple burins, k laterally-carinated piece, l-m carinated endscrapers, n-o. blades with invasive "Aurignacian" retouch, p. bladelet core/endscraper, q. lateral burin/bladelet core, r. prismatic bladelet core. Sources: a-c, r. Warwasi Cave various levels, d-e. Yafteh Cave, f-k, q. Shanidar Cave Level C, l-p Karaïn Cave B. Redrawn Yalçinkaya and Otte (2000), Otte and Kozlowski (2007).

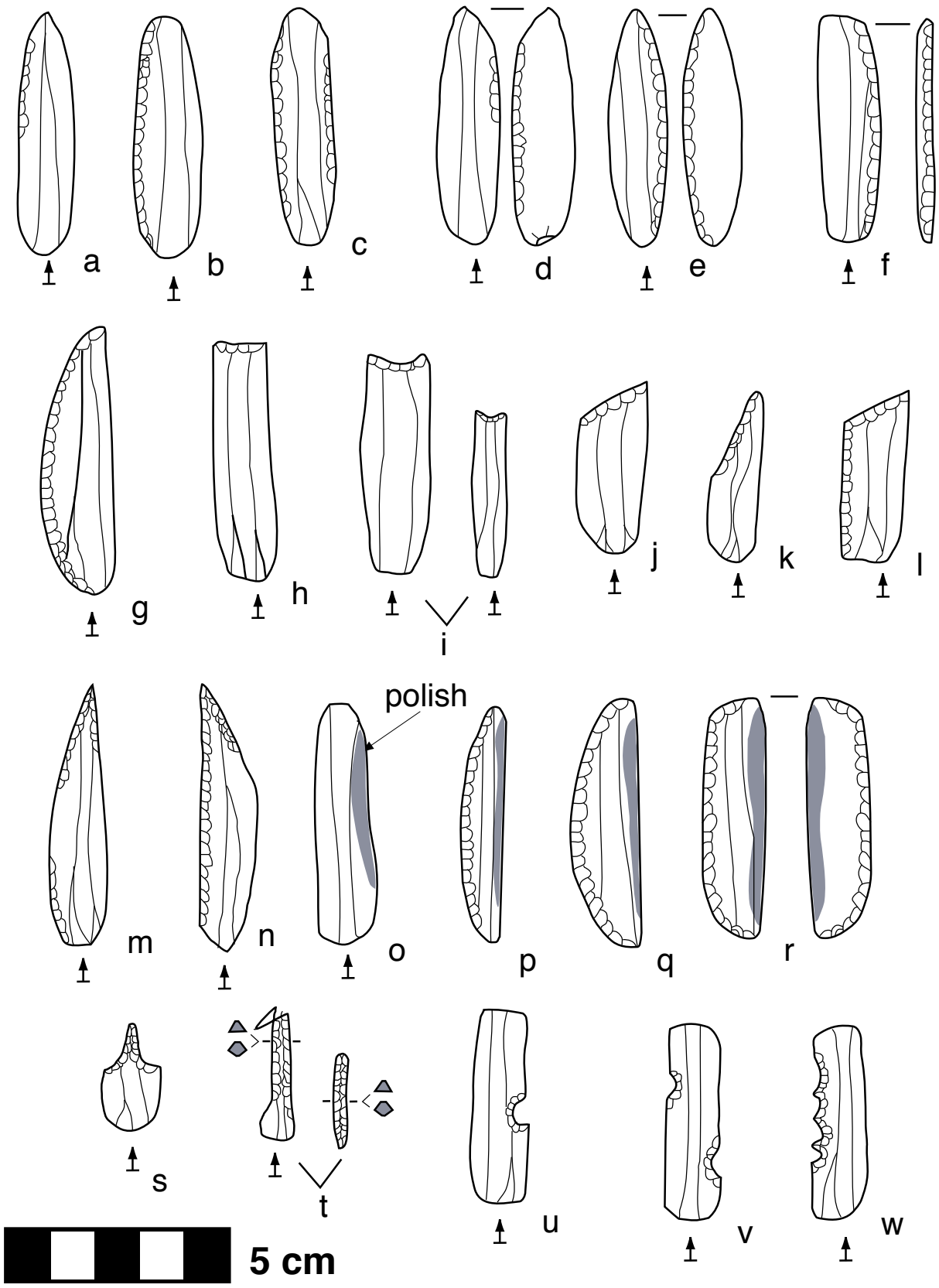

Figure 32. Schematic diagram of Epipaleolithic retouched blade tools. a. Partially retouched backed blade, b. Completely retouched backed blade, c. Backed blade with both edged backed, d. Inversely/alternately retouched backed blade, e. Helwan blade, f. Backed knife, g. Curved backed knife, h. Straight truncation, i. Concave truncation, j. Oblique truncation (high angle), k. Oblique/backed truncation (low angle), l. Backed and truncated piece, m. El Wad point, n. Falita point, o. Unretouched sickle blade, p. Sickle blade on backed blade or bladelet, q. Sickle blade on curved backed blade, r. Sickle blade on Helwan blade or bladelet, s. Awl, t. Borer, u. Notched blade, .v Multiple notched blade, w. Denticulated blade. Scale is approximate.

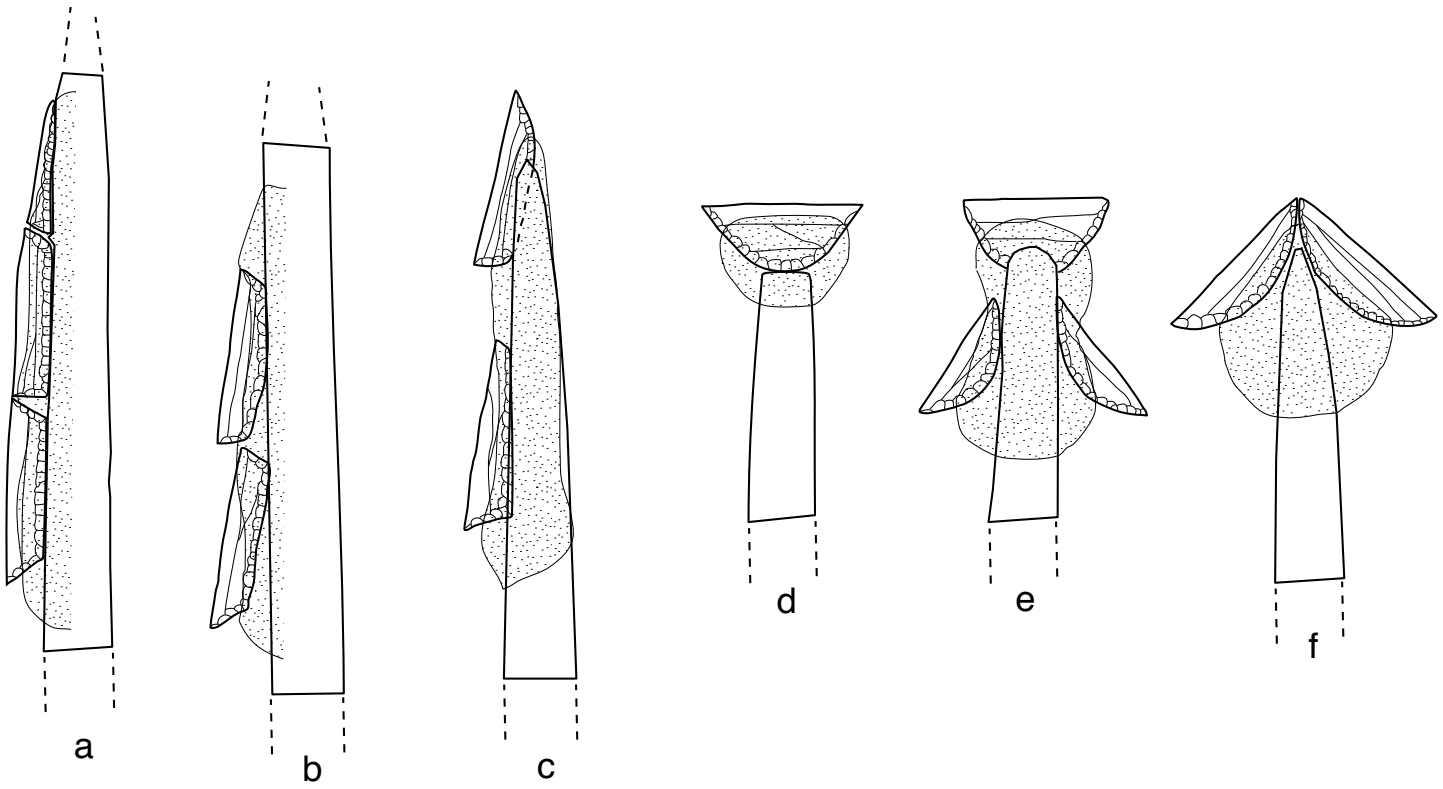

Figure 33. Hypothetical hafting arrangements for Levantine Epipaleolithic microliths. a–c. Middle Epipaleolithic trapezoids, d–f. Late Epipaleolithic crescents. Redrawn after Yaroshevich et al. (2010: Figure 14).

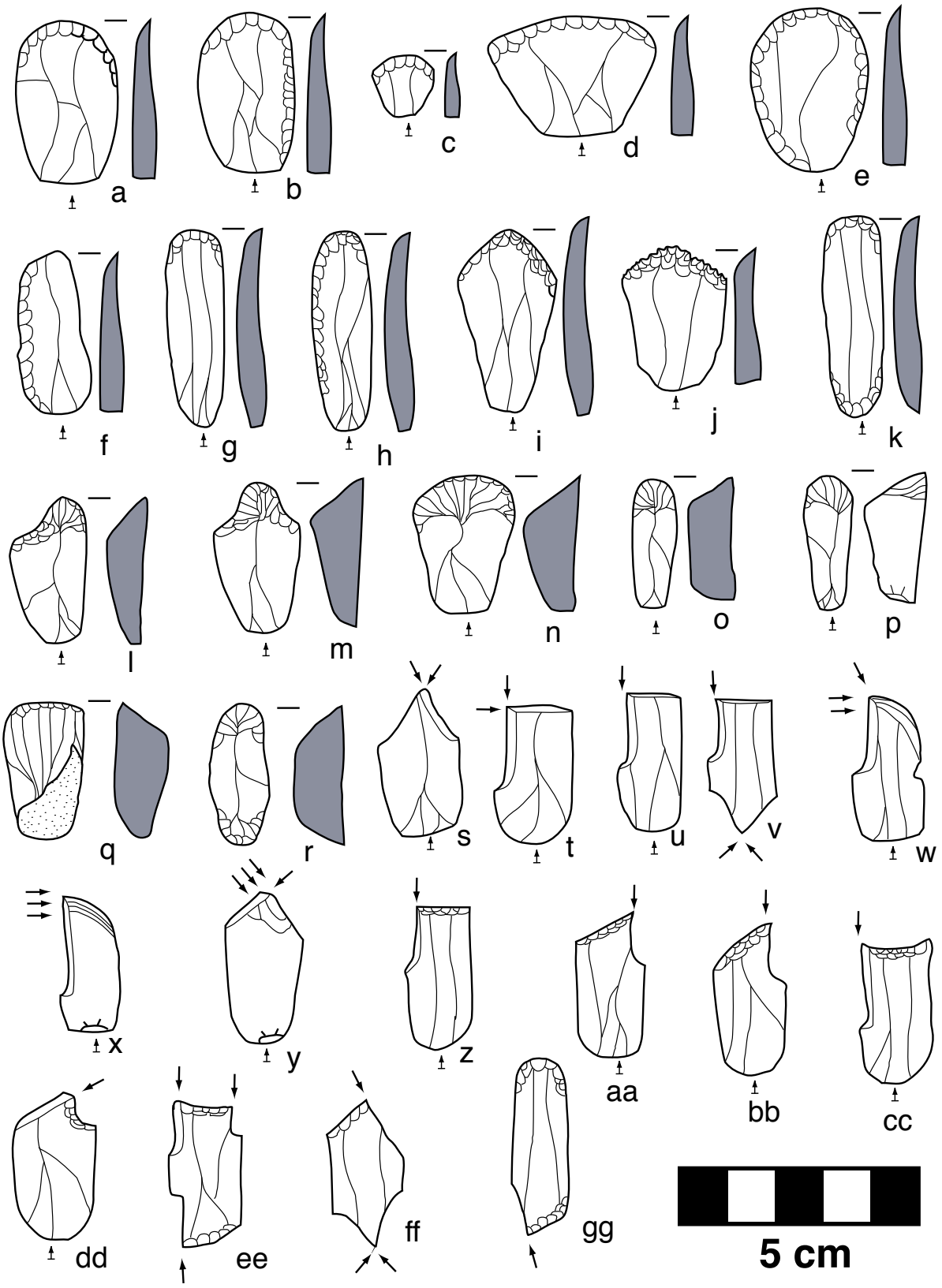

FIGURE 34. Schematic diagram of Common Epipaleolithic retouched tools: Scrapers (a-k), carinated pieces (l-r), burins (s-ff), mixed types (gg). a. scraper on flake, b. scraper on retouched flake, c. thumbnail scraper, d. transversal scraper, e. rounded or circular scraper, f. sidescraper, g. scraper on blade or bladelet, h. scraper on retouched blade or bladelet, i. ogival scraper, j. denticulated endscraper, k. double scraper, l. shouldered scraper, m. nosed scraper, n. broad carinated scraper, o. narrow carinated scraper, p. lateral carinated scraper, q. core scraper, r. double carinated scraper, s. dihedral burin, t. dihedral angle burin, u. burin on break/natural surface, v. double dihedral burin, w. beaked burin, x. carinated burin, y. flat-faced burin, z. burin on straight truncation, aa. burin on oblique truncation, bb. burin on convex truncation, cc. burin on concave truncation, dd. burin on lateral notch, ee. transverse burin on lateral notch,ff. multiple mixed burin, gg. burin/scraper. Redrawn after Goring-Morris (1987).

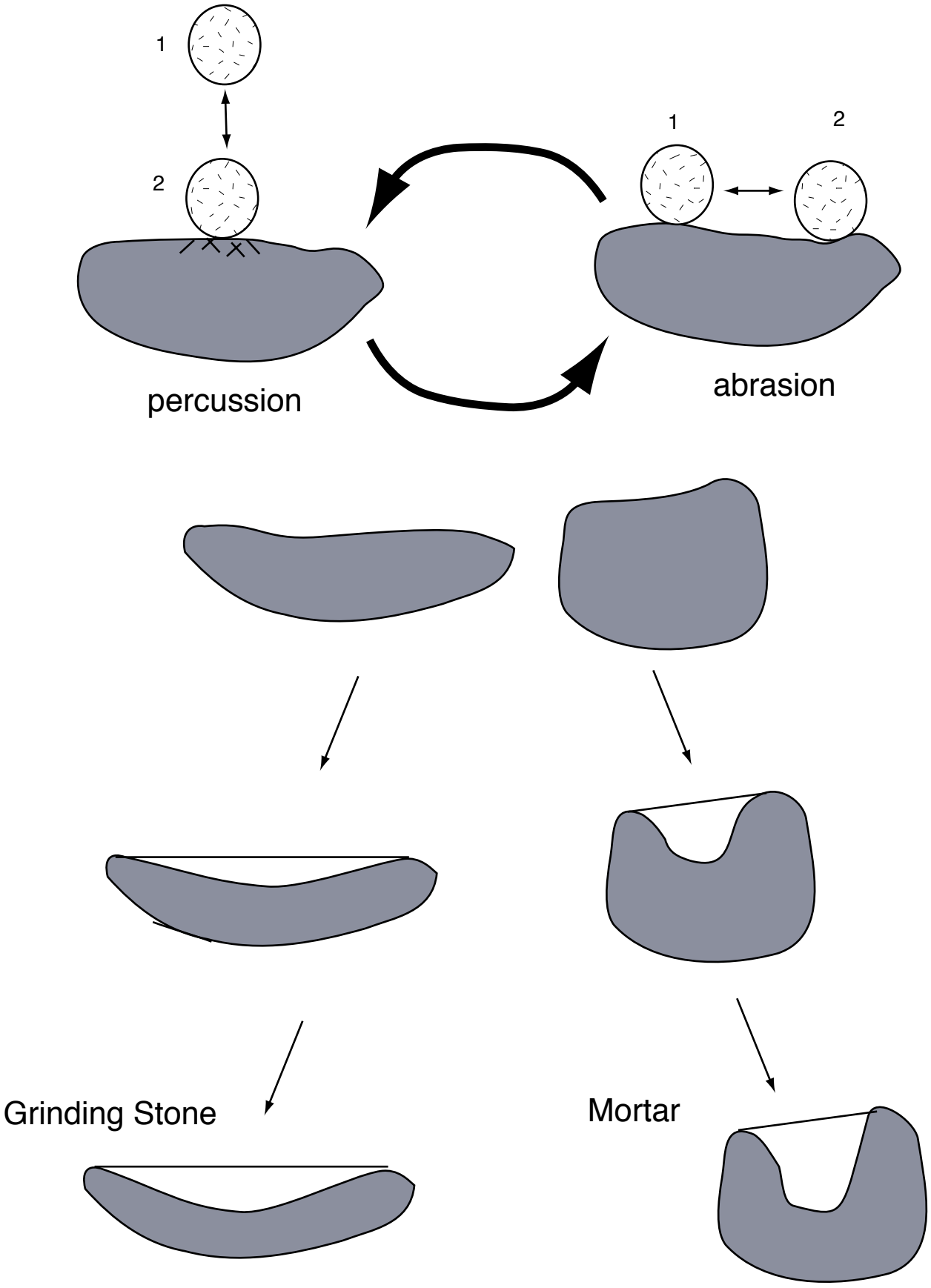

FIGURE 35. Schematic diagram showing how groundstone tools are shaped by percussion and abrasion.

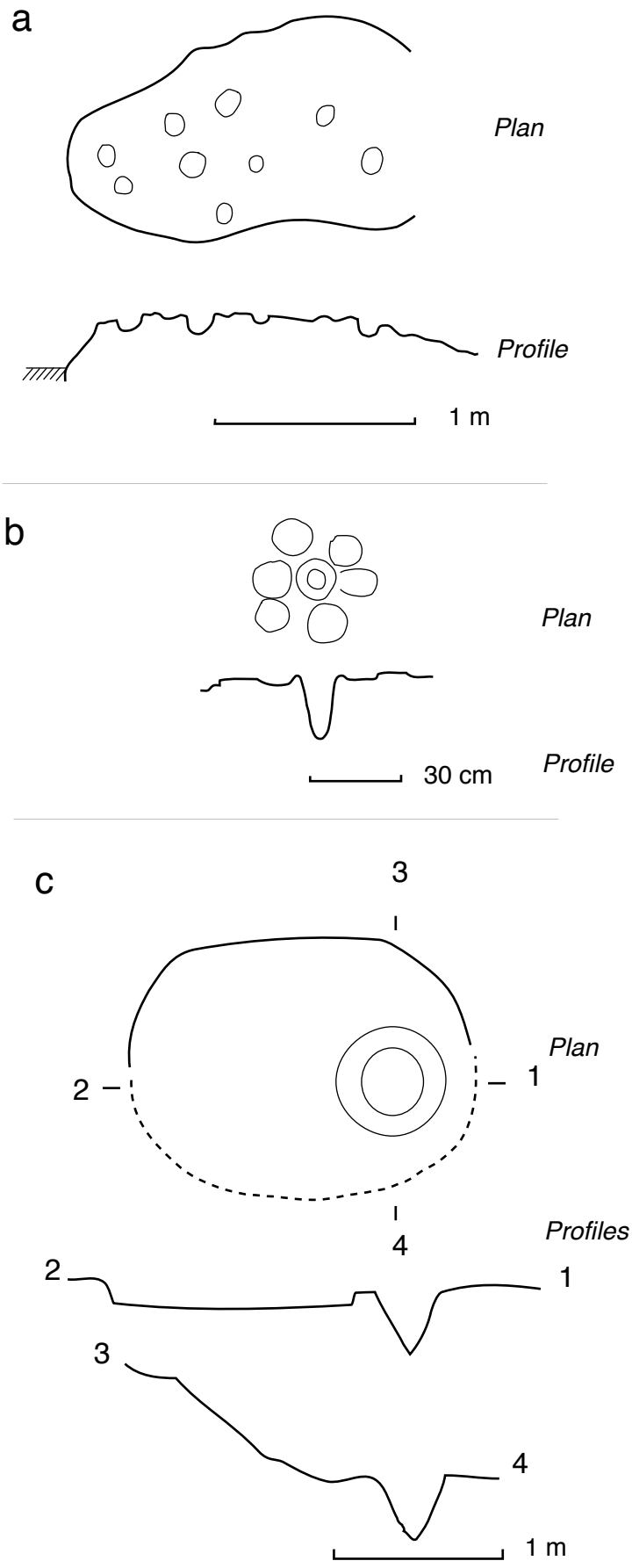

Figure 36. Epipaleolithic rock-cut installations. a. cluster of "cup-marks"/mortar-holes, b. cluster of "cup-marks"/mortar holes and narrow cone mortar), c. horizontal grinding surface and narrow cone mortar). Sources: Hruk Musa (a), Abu Salem (b) El Wad Terrace (c). Redrawn after Eitam (2009).

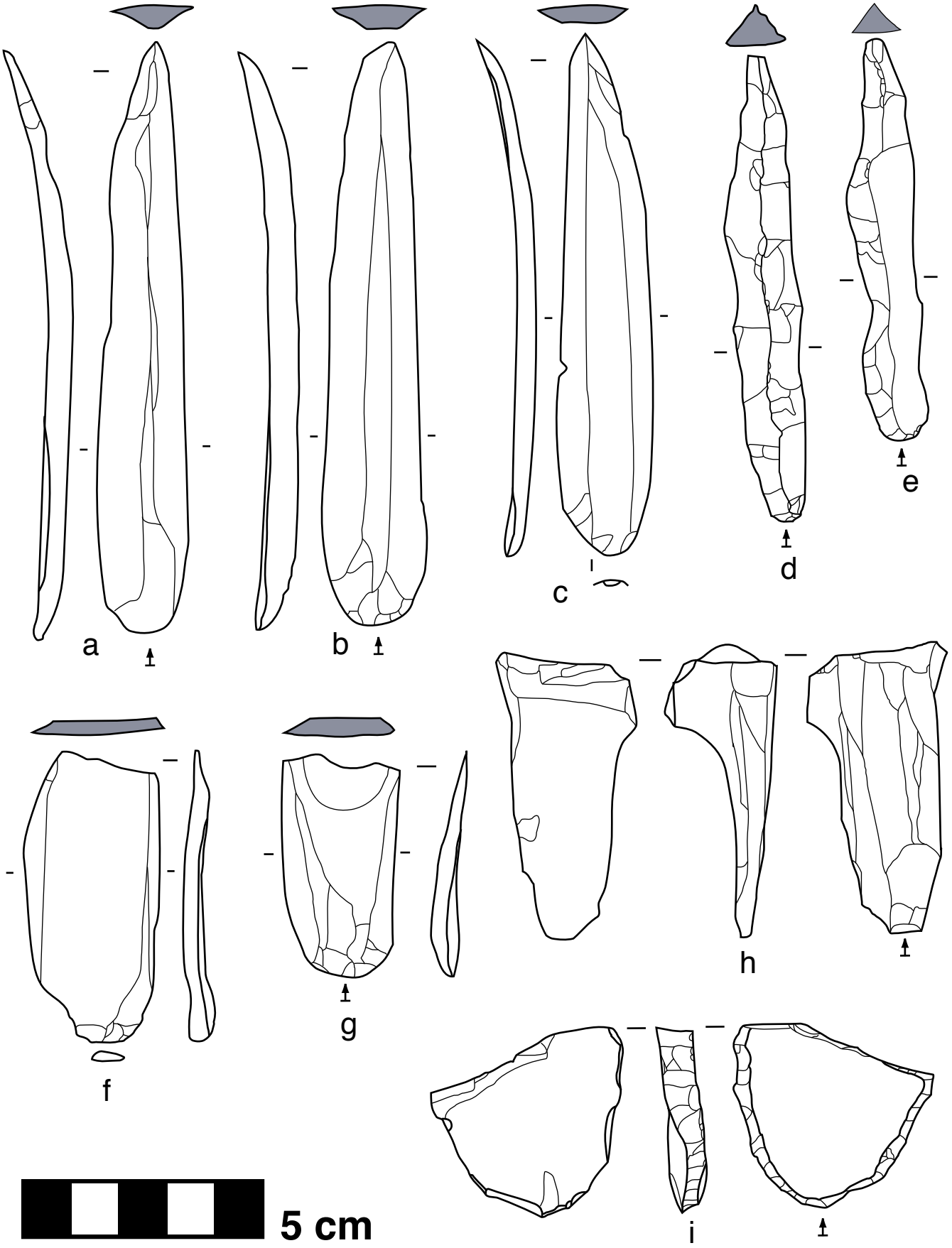

Figure 37. Neolithic blades and blade-core trimming elements. a-c. prismatic blades, d-e. crested blades, f-g. bidirectional blades/distal blade core rejuvenation flakes, h. overshot flake, i. core tablet flake. Sources: Beidha (d-e, h-i). Tell Ain el-Kerkh (a-c, f-g). Redrawn after Arimura (2011), Mortensen (1970).

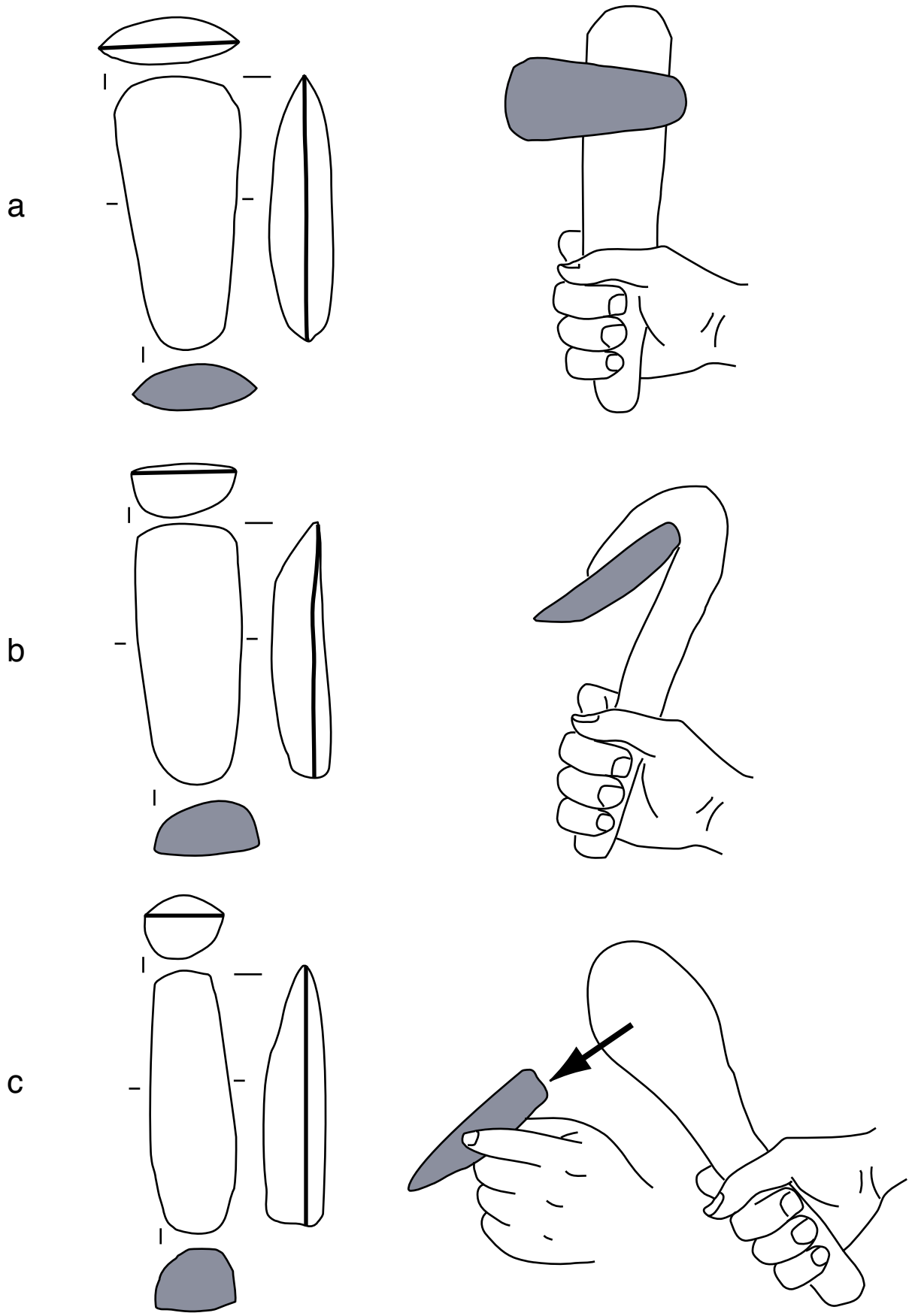

FIGURE 38. Morphological differences among celts (left) and presumed modes of use (right). a. axe, b. adze, c. chisel.

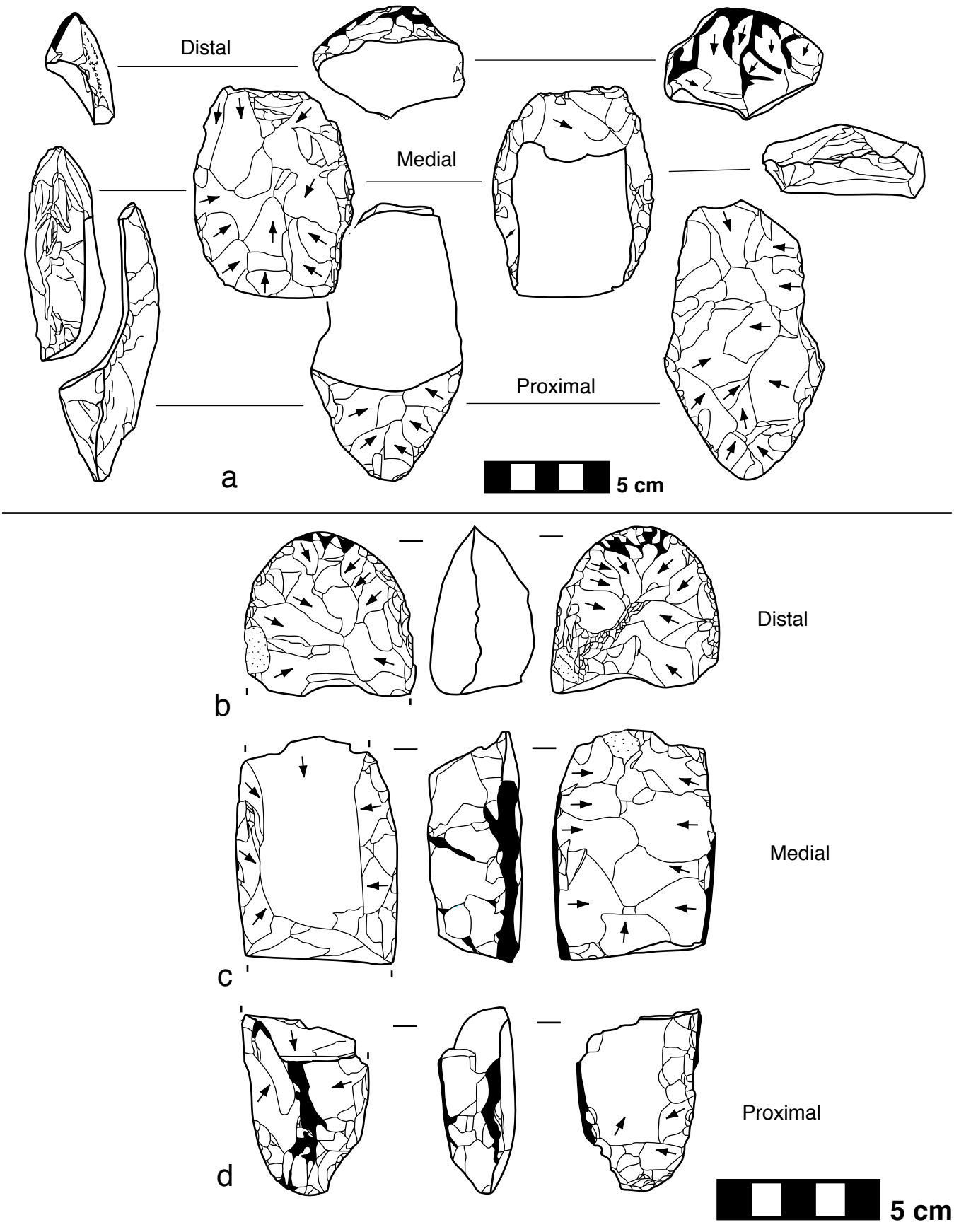

FIGURE 39. Neolithic celt fragments. a. distal, medial, and proximal fragments of a celt broken by "Huleh" bending fractures, b-d. distal, medial and proximal celt fragments broken by lateral snapping and bending fractures. Sources: a. Besiamoun and Abu Ghosh, b-d. Nahal Zehora II. Redrawn after Barkai (2005).

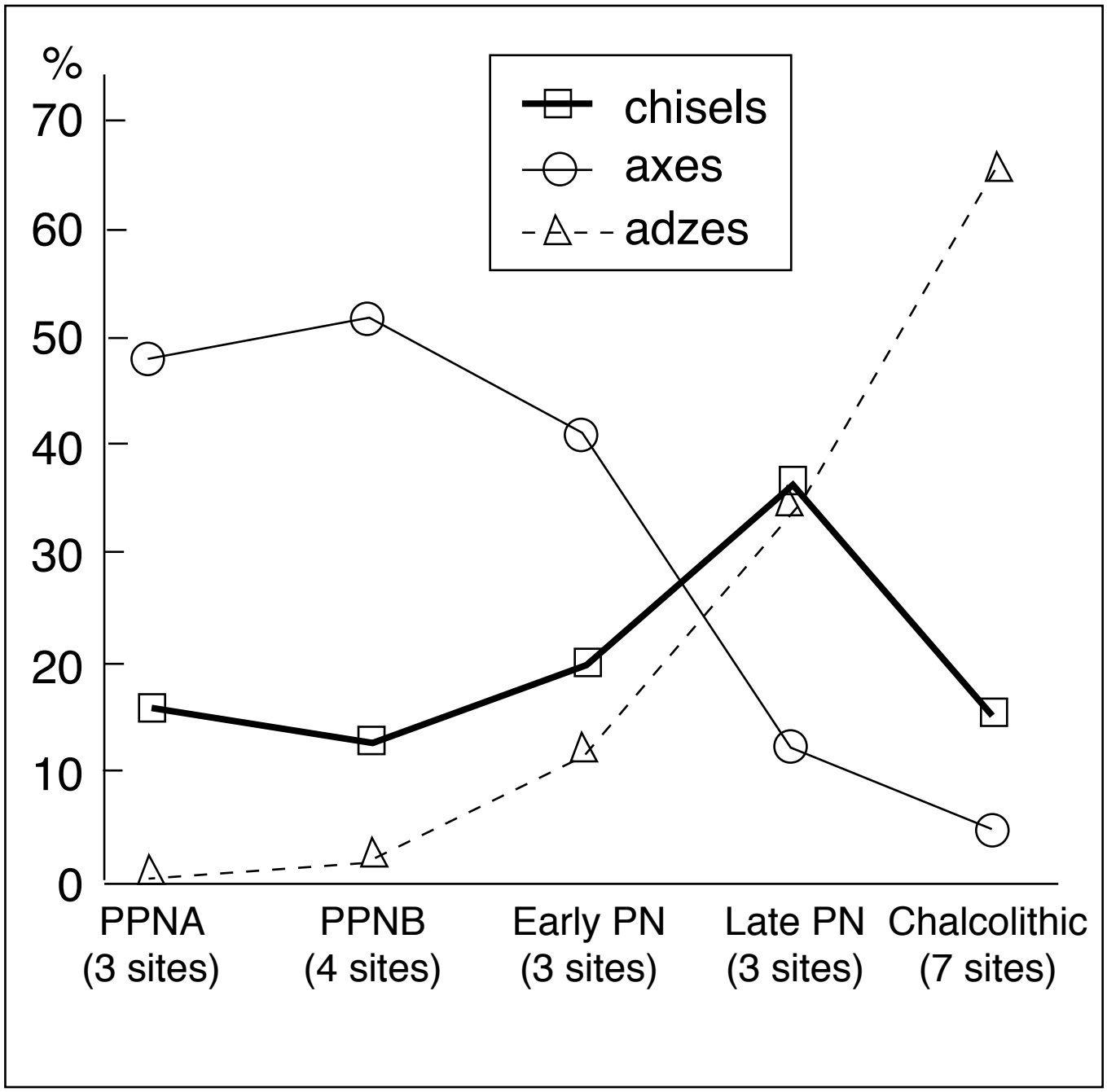

FIGURE 40. Relative frequencies of different celt types in Neolithic assemblages. Redrawn after Barkai (2005).

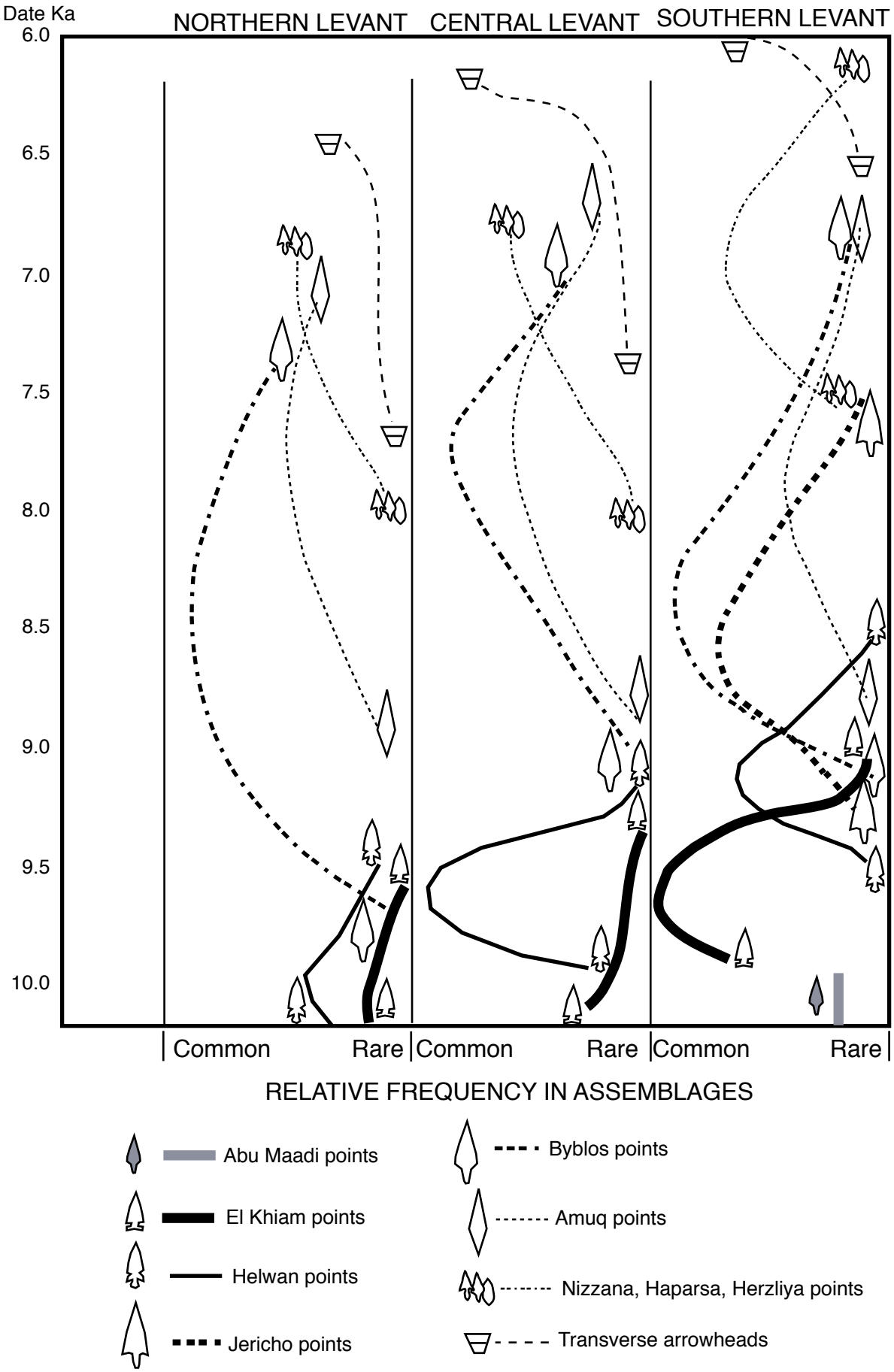

FIGURE 41. Neolithic projectile point chronology. Redrawn after Gopher (1994).

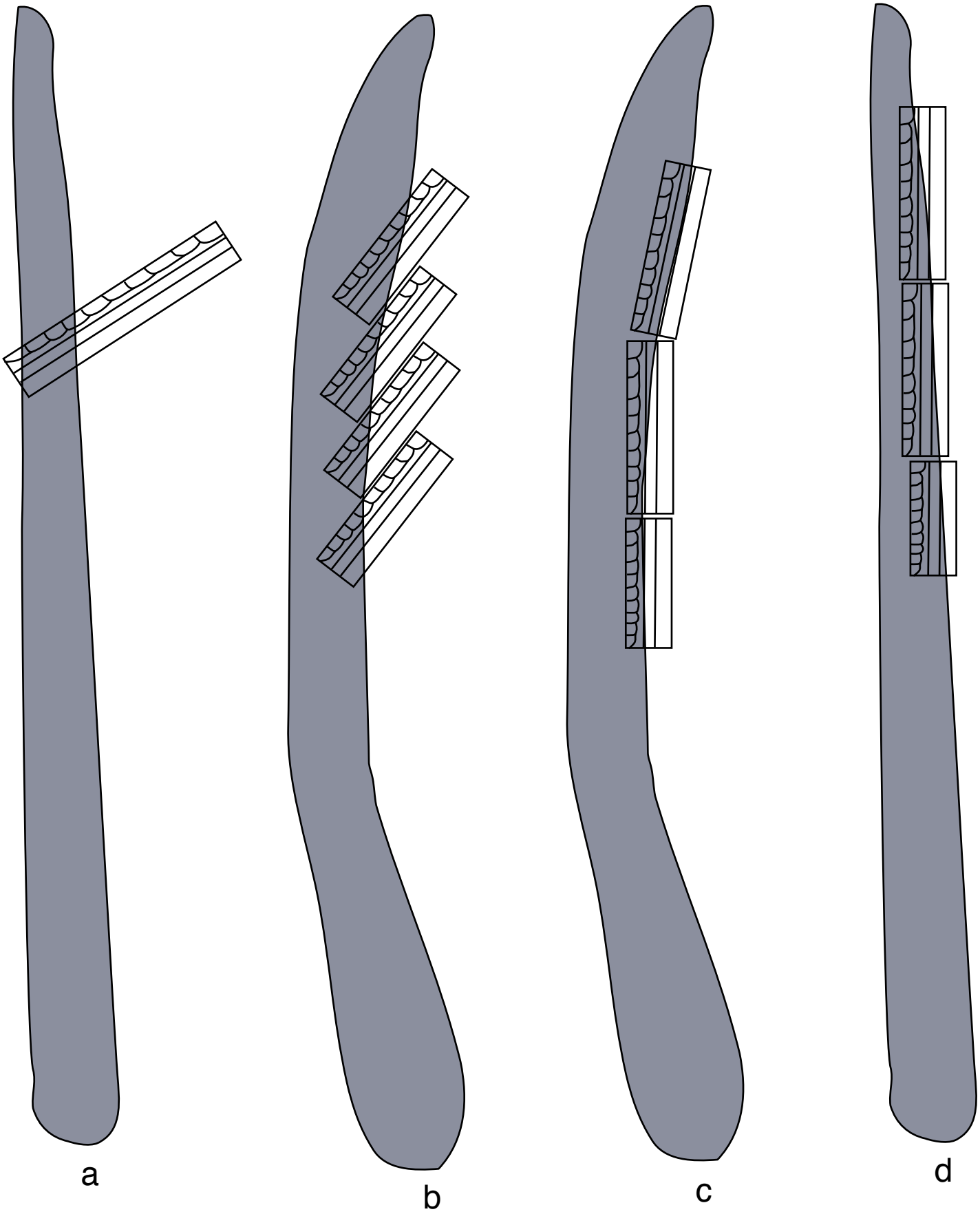

Figure 42. Conjectural hafting of sickle inserts. a. Single insert set diagonally or perpendicularly into a straight handle, b. multiple inserts set diagonally into a curved handle, c. multiple inserts set parallel a curved handle, d. multiple inserts set parallel into a straight handle.

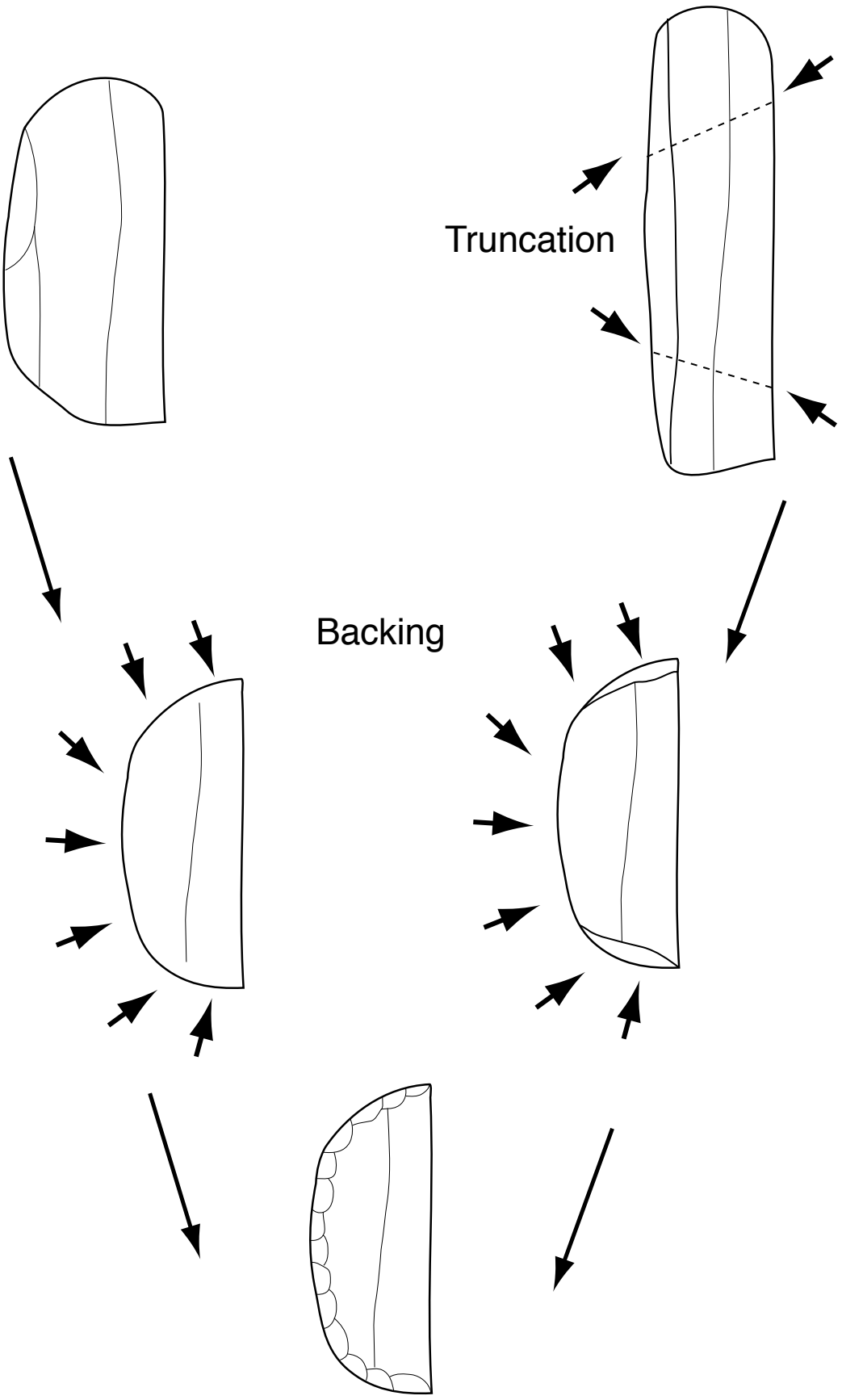

FIGURE 43. Convergent strategies for microlith production.

REFERENCES CITED

Arimura, M. 2011. "LPPNB blade caches at Tell Ain el-Kerkh, north-west Syria," in *The State of the Stone: Terminologies, Continuities and Contexts in Near Eastern Lithics*. Edited by E. Healey, S. Campbell, and O. Maeda, pp. 373-384. Berlin: ex oriente.

Bar-Yosef, O. 2000. "The Middle and Early Upper Paleolithic in Southwest Asia and Neighboring Regions," in *The Geography of Neandertals and Modern Humans in Europe and the Greater Mediterranean*. Edited by O. Bar-Yosef and D. Pilbeam, pp. 107-156. Cambridge, MA: Peabody Museum of Archaeology and Ethnology, Bulletin No. 8.

Bar-Yosef, O., and N. Goren-Inbar. 1993. *The Lithic Assemblages of 'Ubeidiya. Qedem 34*. Jerusalem: Hebrew University Institute of Archaeology.

Barkai, R. 2005. *Flint and Stone Axes as Cultural Markers. Socio-Economic Changes as Reflected in Holocene Flint Tool Industries of the Southern Levant*. Berlin: ex oriente.

Barkai, R., A. Gopher, and R. Shimelmitz. 2006. Middle Pleistocene blade production in the Levant: An Amudian assemblage from Qesem Cave, Israel. *Eurasian Prehistory* 3:39-74.

Baumler, M. F., and J. D. Speth. 1993. "A Middle Paleolithic Assemblage from Kunji Cave, Iran," in *The Paleolithic Prehistory of the Zagros-Taurus*. Edited by D. Olzewski and H. L. Dibble, pp. 1-73. Philadelphia, PA: University of Pennsylvania Museum (Monograph No. 83).

Bergman, C. A. 1987. *Ksar Akil, Lebanon. A Technological and Typological Analysis of the Later Paleolithic Levels at Ksar Akil. Volume II: Levels XIII-VI*. Oxford: British Archaeological Reports International Series (no. 329).

Clark, J. D. 1967. The Middle Acheulian Occupation site at Latamne, northern Syria. *Quaternaria* 9:1-68.

Copeland, L. 1989. "The artifacts from the sounding of D. Kirkbride at Lion Spring, Azraq in 1956," in *The Hammer on the Rock: Studies in the Early Palaeolithic of Azraq, Jordan (part 1)*. Edited by L. Copeland and F. Hours, pp. 171-212. Oxford: British Archaeological Reports International Series 540 (ii).

Dibble, H. L., and S. J. Holdaway. 1993. "The Middle Paleolithic Industries of Warwasi," in *The Paleolithic Prehistory of the Zagros-Taurus*. Edited by D. Olzewski and H. L. Dibble, pp. 75-99. Philadelphia, PA: University of Pennsylvania Museum (Monograph No. 83).

Eitam, D. 2009. Late Epipalaeolithic Rock-Cut Installations and Groundstone Tools in the Southern Levant. Methodology and Classification System. *Paléorient* 35:77-104.

Gopher, A. 1994. *Arrowheads from the Neolithic Levant: A Seriation Analysis*. Winona Lake, IN: Eisenbrauns.

Goren-Inbar, N., A. Lister, E. Werker, and M. Chech. 1994. A Butchered Elephant Skull and Associated Artifacts from the Acheulian Site of Gesher Benot Ya'aqov, Israel. *Paléorient* 20:99-112.

Goren-Inbar, N., and I. Saragusti. 1996. An Acheulian Biface Assemblage from Gesher Benot Ya'acov, Israel: Indications of African Affinities. *Journal of Field Archaeology* 23:15-30.

Goren-Inbar, N., G. Sharon, N. Alperson-Afil, and I. Laschiver. 2008. The Acheulean massive scrapers of Gesher Benot Ya'aqov a product of the biface chaîne opératoire. *Journal of Human Evolution* 55:702-712.

Goren-Inbar, N., I. Zohar, and D. Ben-Ami. 1991. A new look at old cleavers -Gesher Benot Ya'aqov. *Mitekufat Haeven* 24:7-33.

Goring-Morris, A. N. 1987. *At the Edge: Terminal Pleistocene Hunter-Gatherers in the Negev and Sinai*. Oxford: British Archaeological Reports International Series 361.

Marks, A., and D. Kaufman. 1983. "Boker Tachtit: the Artifacts," in *Prehistory and Paleoenvironments in the Central Negev, Israel*, vol. 3: The Avdat/Aqev Area (Part 3). Edited by A. Marks, pp. 69-126. Dallas, TX: Southern Methodist University Press.

Marks, A. E. 1977. "The Upper Paleolithic Sites of Boker Tachtit and Boker: A Preliminary Report," in *Prehistory and Paleoenvironments in the Central Negev, Israel, Vol. 2: The Avdat/Aqev Area, Part 2 and the Har Harif.* Edited by A. E. Marks, pp. 61-79. Dallas: Southern Methodist University Press.

Monigal, K. 2003. "Technology, Economy and Mobility at the Beginning of the Levantine Upper Paleolithic," in *More Than Meets the Eye: Studies on Upper Palaeolithic Diversity in the Near East*. Edited by A. N. Goring-Morris and A. Belfer-Cohen, pp. 118-132. Oxford: Oxbow Books.

Mortensen, P. 1970. A Preliminary Study of the Chipped Stone Industry from Beidha, an Early Neolithic Village in Southern Jordan. *Acta Archaeologica* 41:1-54.

Ohnuma, K. 1989. *Ksar Akil, Lebanon: A Technological Study of the Earlier Upper Paleolithic Levels of Ksar Akil. Volume 3: Levels XXV-XIV*. Oxford, UK: British Archaeological Reports International Series 426.

Otte, M., and J. Kozlowski. 2007. *L'Aurignacien du Zagros*. Liége, Belgiuim: ERAUL.

Roe, D. A. Editor. 1983. *Adlun in the Stone Age*. Vol. 159. *BAR International Series*. Oxford, UK: British Archaeological Reports.

Solecki, R. S., and R. L. Solecki. 1993. "The pointed tools from the Mousterian occupations of Shanidar Cave, northern Iraq," in *The Paleolithic Prehistory of the Zagros-Taurus*. Edited by D. Olzewski and H. L. Dibble, pp. 119-146. Philadelphia, PA: University of Pennsylvania Museum (Monograph No. 83).

Stekelis, M., and D. Gilead. 1966. *Maayan Barukh, A Lower Paleolithic Site in Upper Galilee (in Hebrew)*. Jerusalem: Center for Prehistoric Research.

Yalçinkaya, I., and M. Otte. 2000. Début du Paléolithique supérieur à Karain (Turquie). *L'Anthropologie* 104:51-62.

Yaroshevich, A., D. Kaufman, D. Nuzhnyy, O. Bar-Yosef, and M. Weinstein-Evron. 2010. Design and performance of microlith implemented projectiles during the Middle and the Late Epipaleolithic of the Levant: experimental and archaeological evidence. *Journal of Archaeological Science* 37:368-388.