A NEW TOOL FOR FOSSIL PREPARATION

by Paul A. Selden

Selden, P.A. 2003. A new tool for fossil preparation. *The Geological Curator* 7(9): 337–339.

A new tool for the preparation of fossils, especially those which preserve fine detail in soft matrices, is described. Its benefits are that it keeps the working area clear of rock debris whilst working at high magnification under the microscope, is simple to make and use, and is inexpensive.

Paul A. Selden, Department of Earth Sciences, University of Manchester, Manchester M13 9PL, UK. *Received 24th April 2003.*

Introduction

Laboratory preparation of fossils for study usually involves removal of rock matrix to expose parts not initially visible on field collection, and most preparators use mounted needles to prize away the concealing matrix, gently or firmly depending on the hardness of the matrix. Harder rocks require the use of vibrating tools, small circular saws, and other equipment, but for general purposes, and in soft matrices, a mounted needle is generally sufficient. However, this process usually results in a small pile of debris, a micro-scree, covering the very parts one wishes to expose. A swift exhalation of breath is normally suffcient to remove this debris, but this involves taking the specimen away from the microscope and then having to reposition it to continue work. With soft matrices, and at high magnification, this becomes tiresome because the micro-scree builds up rapidly, and using high magnification means a difficult repositioning procedure every few minutes. This is certainly the case with the mainly Mesozoic arthropods preserved in Plattenkalks and other soft lacustrine sediments with which I have been involved over the last few years (e.g. Dunlop and Selden 2003; Selden 1990, 1996, 2001, 2002; Selden *et al*. 1999). A solution to this problem came with invention of the tool described here, and first mentioned briefly in Selden and Shear (1996): the Aeroneedle.

Construction of the Aeroneedle

Construction of the Aeroneedle is simple and straightforward. Only two items are necessary: a small air-pump such as used to aerate water in a small aquarium, and a steel hypodermic needle (Figure 1).

The air-pump

The air-pump needs to deliver only a gentle breeze at the needle tip, sufficient to blow away loose debris, although during this process some degree of further erosion may also occur as the debris effectively 'sand-blasts' the specimen. Debris which is already loose, and other stray matter such as hairs and dust, are removed by the airstream without any physical abrasion with the needle. Indeed, it is useful to use the aistream simply to remove dust and hairs before any microscope observation or photography, whether dry, under alcohol, coated with ammonium chloride, etc. Many different makes and models of air-pump are available from aquarists. The smaller pumps (*c*. 70 l hr^{-1}) work perfectly adequately. It is convenient to add a switch to yurn the pump on and off instead of using the plug (these pumps are designed for continuous operation). The air-pump should be equipped with standard flexible plastic tube which fits neatly over the base of a hypodermic needle.

The hypodermic needle

I use old, re-usable hypodermic needles recovered from an early 20th century general practioner's medical case, although new ones would be equally functional. Re-usable needles have greater strength and, in particular, metal barrels which fit neatly into the flexible tube from the air-pump. Strength is required because the needle has not only to deliver air to the working site but also to pick away at the solid matrix, which may be quite hard. The end of the needle is bevelled, which provides a sharp, wedge-shaped point, which is useful for prizing open cracks in the matrix. The needle size I generally use is XX, but larger or smaller sizes may be used as necessary.

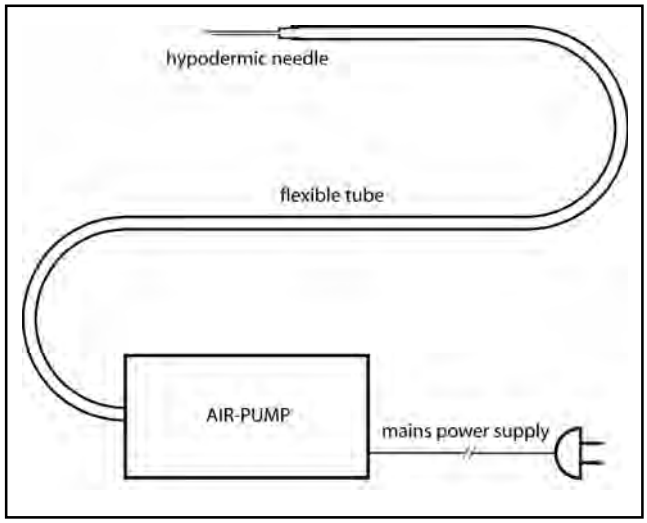

Figure 1. Diagram showing construction of the Aeroneedle.

Should the needle become blunt, it can be replaced with a fresh one or sharpened with a small grinder or emery paper.

The Aeroneedle in use

Figures 2A and 2B show an example of a specimen respectively before and after preparation using the Aeroneedle. The matrix of this specimen is a soft limestone which is easily removed by a scraping action using the bevelled tip of the needle. The continuous air flow keeps the fine detail (e.g. hairs, spines, trichobothria) visible, thus preventing their accidental removal, whilst also removing loose matrix and, to a certain extent, sand-blasting the matrix with already loosened debris.

Harder, less weathered matrices require the needle to be used as a general picking device; the airflow is useful here to clean up the preparation site following removal of more sizeable chunks of rock. A useful enhancement to the aeroneedle if hard matrices are to be prepared regularly would be to provide a more substantial grip. The choice of needle is also important here: one with a hard point and firmness, especially where the needle joins the base, is most useful.

Conclusions

Many hours of preparation on a variety of matrices and types of fossil using this tool have been rewarded with excellent results: exposure of fine morphological details quickly and easily without damage and with the ease afforded by being able to see the results instantly, and without having to stop preparation at regular intervals to blow away loose debris, have made this tool indispensible in this type of preparation work. The new tool is recommended to preparators and other palaeontologists who work with delicate specimens in relatively soft matrices. I should be delighted to hear from others who employ this tool, and learn of their experiences and any enhancements they might suggest.

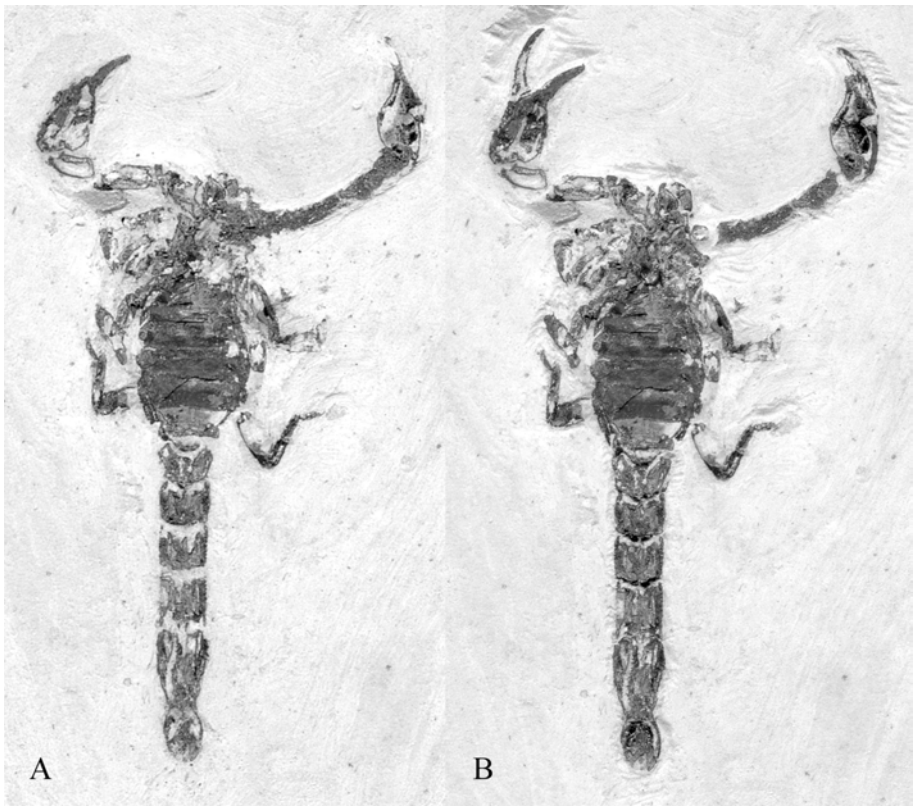

Figure 2. Undescribed scorpion, ventral side, Crato Formation, Chapada do Araripe, Brazil; UMM LL.12484 (x2). A. Before preparation with Aeroneedle. B. After preparation; note sediment cleaned from between tail segments and coxal region, exposure of movable fimger of right chela (on left), and excavation left pedipalp (on right) revealed that, apart from the chela, much of this appendage is faked with coloured wax.

Acknowledgements

I thank Dave Martill and Bob Loveridge (University of Portsmouth, UK), and Dong Ren (Capital Normal University, Beijing), for encouragement that this tool was a novel design and worth sharing with other palaeontologists.

References

DUNLOP, J.A. and SELDEN, P.A. 2003. A trigonotarbid arachnid from the early Devonian of Tredomen, Wales. *Palaeontology*. In press.

SELDEN, P.A. 1990. Lower Cretaceous spiders from the Sierra de Montsech, north-east Spain. *Palaeontology* **33**, 257–285.

SELDEN, P.A. 1996. Fossil mesothele spiders. *Nature, London* **379**, 498-499.

SELDEN, P.A. 2001. Eocene spiders from the Isle of Wight with preserved respiratory structures. *Palaeontology* **44**, 695–729.

SELDEN, P.A. 2002. First British Mesozoic spider, from Cretaceous amber of the Isle of Wight, southern England. *Palaeontology* **45**, 973–983.

SELDEN, P.A., ANDERSON, H.M., ANDERSON, J. M. and FRASER, N.C. 1999. The oldest araneomorph spiders, from the Triassic of South Africa and Virginia. *Journal of Arachnology* **27**, 401–414.

SELDEN, P.A. and SHEAR, W.A. 1996. The first Mesozoic Solifugae (Arachnida), from the Cretaceous of Brazil, and a redescription of the Palaeozoic solifuge. *Palaeontology*, **39**, 583–604.