

ULTRASTRUCTURE OF THE CUTICLE OF *SABATIERIA*
(NEMATODA, CHROMADORIDA)
AND ITS PHYLOGENETIC SIGNIFICANCE

by

H. H. IKEN

Institut für Meeresforschung Bremerhaven,
Am Handelshafen 12, 2850 Bremerhaven, West Germany

ABSTRACT

The ultrastructure of the cuticle of *Sabatieria pulchra* was studied. It consists of a thick cortical layer with striated appearance, an electron translucent median layer traversed by very dense rods and a basal layer consisting of two fibrous sublayers. The structure of the cuticle does not provide a definite hint concerning the systematic position of the Comesomatidae.

INTRODUCTION

The Comesomatidae with their very abundant genus *Sabatieria* ROUVILLE, 1903 have a somewhat questionable systematic position. In the presently accepted system they are placed among the Chromadorida but there are arguments against such position (structure of ovaries, oesophagus, excretory organ : see RIEMANN, 1977). Because of the doubtful status of the systematic position of the Comesomatidae an investigation on the ultrastructure of the cuticle of *Sabatieria* has been conducted.

MATERIAL AND METHODS

The material originated from the Weser Estuary. Small body sections were fixed in cold 2,5 % glutaraldehyde solution (buffered at pH 7,4) for 2 hours, then washed and postfixed in 1 % osmium tetroxide for 2 hours. For better handling the pieces were embedded in agar then dehydrated in ascending grades of ethanol, treated with propylene oxide and embedded in Araldit. Sections were stained with uranyl acetate and lead citrate. They were studied in an EM-9 Zeiss electron microscope.

OBSERVATIONS

The cuticle of *Sabatieria pulchra* (G. SCHNEIDER, 1906) has a very complicated ultrastructure (Figs. 1a, b). The basal layer (labelled 3a, 3b) is divided into two well distinguishable sublayers. The inner part consists of a thick layer of crossed fibers which are arranged in several sublayers, comparable to the lamellar zone of *Xiphinema* (Dorylaimida) as described by ROGGEN et al. (1967). The fibers which

make up the character of this zone are extremely strong and ribbonlike. They form an angle of about 90 degrees with each other (Fig. 1a).

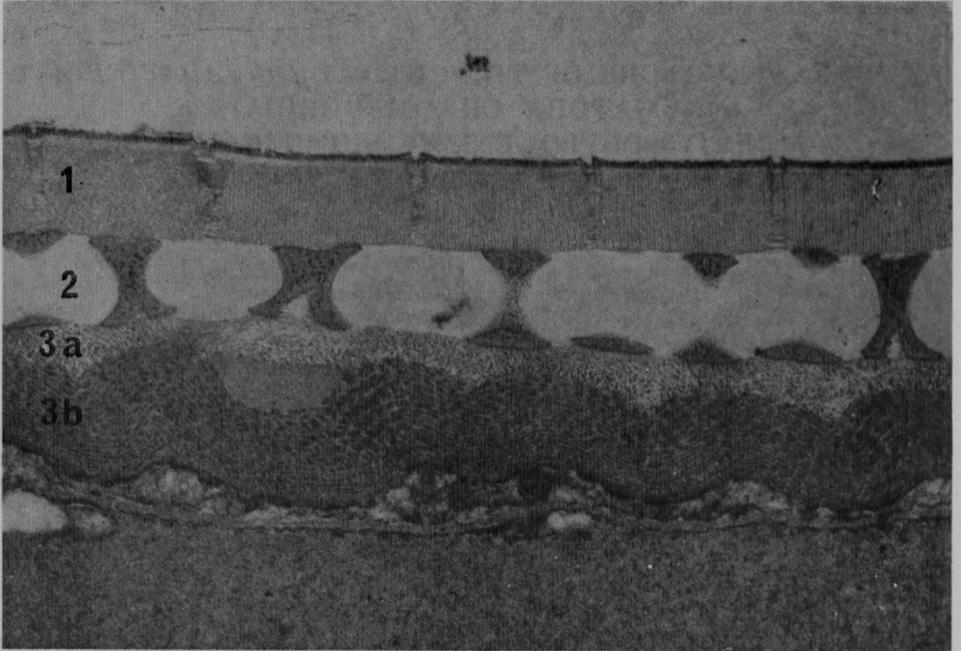


Fig. 1a. — Cross section of the cuticle of *Sabatieria pulchra*: 1) cortical layer, 2) median layer, 3a) outer part of the basal layer, 3b) inner part of the basal layer.

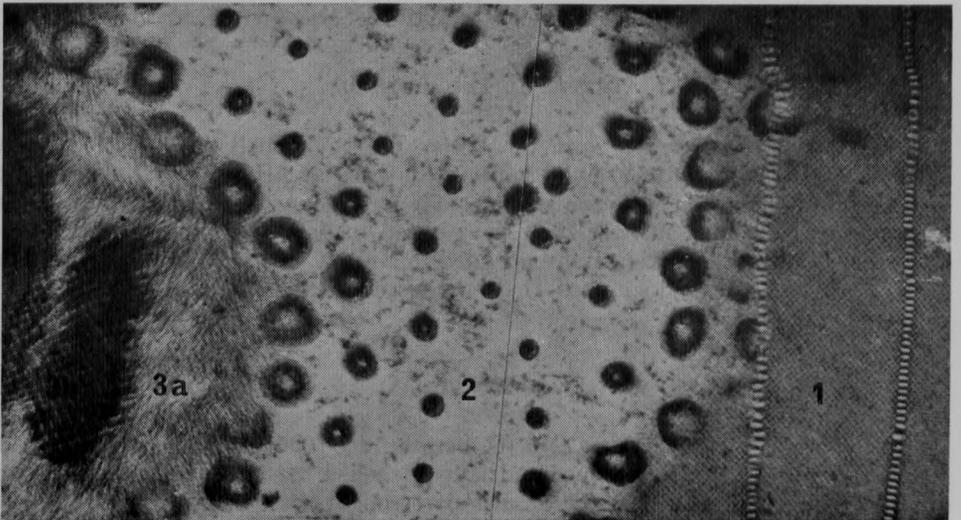


Fig. 1b. — Oblique longitudinal section of *Sabatieria pulchra*: 1) cortical layer, 2) median layer, 3a) outer part of the basal layer, 3b) inner part of the basal layer.

This zone is followed by a second one which in cross sections appears to consist of irregularly arranged fibers; however, in oblique longitudinal sections it is obvious that these fibers are following a main direction and are arranged in two zones forming an angle of about 50 degrees with each other.

The median layer appears as an electron translucent zone traversed by extremely dense rods which are partially hollow. The rodlike arrangement of this dense material produces in the light microscope the image of cuticular punctation.

The median layer is covered by a thick cortical layer. In cross sections (Fig. 1b) this layer has a striated appearance, but in oblique longitudinal sections it is evident that this appearance is caused by parallel rows of rodlike structures crossing each other at right angles.

DISCUSSION

Asking now for the phylogenetic significance of the cuticle structure of *Sabatieria* there are certain similarities to Cyatholaimidae like *Acanthonchus* (WRIGHT and HOPE 1968). In both genera the cortical layer shows a striate appearance and the median layer appears as an electron translucent matrix traversed by electron dense rods. However, the basal layer in *Acanthonchus* is a very thin one while in *Sabatieria* it is very broad and divided into two sublayers which in their turn are subdivided. The rods which exist in the median layer of *Sabatieria* cannot be regarded to be characteristic for Chromadorida because such rodlike structures are also to be seen in the cuticle of the Rhabditida *Caenorhabditis* (ZUCKERMAN et al., 1973) and *Eudiplogaster* (own observation on *Eudiplogaster pararmatus* (W. SCHNEIDER, 1938)] and even in the cuticle of Tardigrades as the recent work of GREVEN (1975) on *Halechiniscus* demonstrates.

On the other hand there are also similarities to *Xiphinema*. The second layer of this species possibly is not so structureless as it appears in cross sections; the filaments observed by ROGGEN et al. (1967) may point to an indistinct striation of this layer which should be seen in oblique sections. In addition, the basal layer of *Xiphinema* has the same lamellar differentiation as the inner basal zone of *Sabatieria*. The total basal layer of *Sabatieria* is a very extended fiber layer. Such distinct crossed fiber layers are unknown as yet in the order Chromadorida but are occurring in Enoplida and Secernentea, as for example the cuticle of *Caenorhabditis* shows. Concluding, I would say that the cuticle of *Sabatieria* provides no definite hints which suggest that Comesomatidae should have a position within the Chromadorida.

ACKNOWLEDGEMENT

This contribution has been promoted by a grant given by the Deutsche Forschungsgemeinschaft.

REFERENCES

- GREVEN, H. (1975) — New results and considerations regarding the fine structure of the cuticle in Tardigrades. *Mem. Ist. Ital. Idrobiol.* **32**, 133-151.
- RIEMANN, F. (1977) — On the excretory organ of *Sabatieria* (Nematoda, Chromadorida). *Veröff. Inst. Meeresforsch. Bremerh.* **16**, 263-267.
- ROGGEN, D. R., RASKI, D. J. & JONES, N. O. (1967) — Further electron microscopic observation of *Xiphinema index*. *Nematologica* **13**, 1-16.

- WRIGHT, K. A. & HOPE, W. D. (1968) — Elaborations of the cuticle of *Acanthonchus duplicatus* Wieser, 1959 (Nematoda : Cyatholaimidae) as revealed by light and electron microscopy. *Can. J. Zool.* **46**, 1005-1011.
- ZUCKERMAN, B. M., HIMMELHOCH, S. & KISIEL, M. (1973) — Fine structure changes in the cuticle of adult *Caenorhabditis briggsae*. *Nematologica* **19**, 109-112.