

TWO NEW SPECIES OF *SEPIA* LINNAEUS, 1758 (CEPHALOPODA: SEPIIDAE) FROM SOUTH AFRICAN WATERS

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ABSTRACT: A new species of cuttlefish: *Sepia barosei* sp. nov. is described from South Africa. Its present distribution is limited to the eastern Agulhas Bank (depth range 119–184 m), but this was based on a small material. It is recognised by prominently dorsal eyes and four turrets (papillae on top of each other) dorsally on the head between the eyes. On the dorsal mantle: four large, prominent patches, two mid anteriorly and two mid posteriorly; smaller turrets, patches and/or tubercles and warts dorsally; skin between these structures smooth and shiny. Ends of I pair of arms without suckers. Cuttlebone lightly calcified, thin and fragile. Second new species, *Sepia roleveldi* sp. nov. is also described (distribution: from Hondeklip to Port Alfred, depth range 181–497 m), and is recognised by small, flat warts very densely and uniformly covering dorsal mantle, head and arms. Two prominent tubercles covered by warts on dorsal head; one similar tubercle in the middle of dorsal mantle (sometimes missing). Ends of I pair of arms without suckers. Cuttlebone thin and fragile, thinly calcified. Description of these new small cuttlefish has led to proposing a new subgenus *Digitosepia* with four species. Both holotypes and some paratypes are deposited in the South African Institute of Aquatic Biodiversity (SAIAB) and other paratypes in the Iziko Museum (SAMC) and the Natural History Museum (NHMUK), London.

KEY WORDS: small cuttlefish; new species; new subgenus; *Digitosepia*; South African waters; *Sepia*

INTRODUCTION

Previous contribution (LIPINSKI & LESLIE 2018) concerning small size Sepiidae from the southern Africa, has briefly outlined various problems with more than one hundred species of the genus *Sepia* Linnaeus, 1758. These problems were already well covered by ADAM & REES (1966) in their monograph, and then by subsequent authors; small sepiids add to these problems. STEENSTRUP (1875) was the first to recognise a peculiarity of small sepiid (*Sepia typica* (Steenstrup, 1875)) for which he created a separate genus, *Hemisepius*. However, subsequent additions to small sepiids made this genus unsustainable without providing much ideas of how small sepiids should fit into the overall classification. The hope was expressed (ROEVELD & LILTVED 1985) that more new species and more material of species already de-

scribed (including *Sepia typica*, original small sepiid) would ultimately clarify this situation. However, so far, each additional species multiplied questions instead of providing answers (which is apparent in LIPINSKI & LESLIE (2018) contribution); remaining hope was in describing at once several small sepiid species. Fortunately, intense and long-term sampling in southern African waters conducted mainly by RS Africana (Sea Fisheries, Cape Town) and R/V Dr Fridtjof Nansen (Institute of Marine Research, Bergen and Food and Agriculture Organisation, Rome) has accumulated large collections of undescribed species. Among them are small sepiids. Two of them are being described now. With this material at least some sketchy explanations are possible and a road ahead can be charted.



MATERIAL AND METHODS

Methods of this study were already outlined by LIPINSKI & LESLIE (2018) and reader is being referred to that work. Some details however were repeated here for clarity. Some changes and clarifications were also suggested and followed.

Specimens for this study were collected using bottom trawls during the course of demersal research surveys conducted off the west and south coasts of South Africa by the research vessels RS Africana and R/V Dr Fridtjof Nansen (Fig. 1). Details of bottom trawl gear, trawling, sorting and processing of the catch, and references thereof are given in AXELSEN & JOHNSEN (2014), although note that they erroneously record the codend mesh size of the gear deployed by the RS Africana, the correct mesh sizes are 112 mm codend with 35 mm small mesh liner.

Measurements and counts (see Table 1 for definitions) follow ROELEVELD (1972), ROELEVELD & LILTVED (1985), and LU & REID (1997) and were taken from preserved specimens. The following changes to the terms and definitions given in Table 1 of LIPINSKI & LESLIE (2018) were made:

1. There is a vague difference between CIRC and TrRC; therefore, TrRC is renamed LORC and defined as a number of suckers counted at midline along the length (Tcl) of the club.

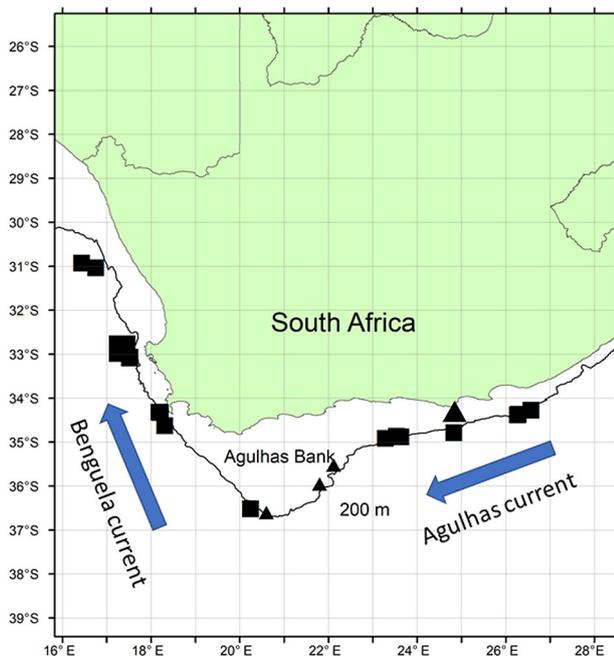


Fig. 1. Chart showing the location of all survey trawls where *Sepia barosei* sp. nov. was recorded (triangles; large triangle: holotype), and the localities for *S. roeleveldi* sp. nov. (squares; large square: holotype), during bottom trawl research surveys off the coast of South Africa

2. CES was imprecisely defined and not easy to follow. It is defined now as a total number of suckers along the border of the whole club.
3. Widest level of the cuttlebone (WL) is added to the measurements, defined as the greatest width of the cuttlebone (perpendicular to L).
4. TIP1AL is defined as length of the suckerless tip of I pair of arms.

Dorsal (ML) and ventral (MLv) mantle length were measured to the nearest mm below using slide callipers. Fin length (FL) was measured by placing a thread along the base of the fin from the anterior edge and marking the position of the posterior end of the fin, the length of the thread was then measured on a metal ruler. All other measurements were taken using dividers or a graticule in a stereo dissecting microscope at 10× magnification. Sucker diameters were measured at 40× magnification. Weights were taken from preserved specimens. Maturities were determined using the scale described by LIPINSKI & UNDERHILL (1995).

Bodies of six species of small sepiids in southern African waters have various complex skin patterns that are important for correct identification of the species. LIPINSKI & LESLIE (2018) developed the following new definitions (or their new combinations) for some of these structures:

1. **Warts** are simple, solid, rounded, flat, and low excrescences on the skin, that may be quite large in diameter. Typical examples are found on the skin of *Sepia roeleveldi* sp. nov.
2. **Tubercles** are simple projections or protuberances, that are sharp or rounded. They may be very long, or short, but never flat. Typical examples are found on the skin of *S. faurei* Roeleveld, 1972.
3. **Papillae** are prominent, complex protuberances in following forms:
 - **Turrets** (see ROELEVELD & LILTVED 1985) where tubercles and/or warts are on top of each other. May become elaborate structures.
 - **Clusters** where tubercles and/or warts are next to each other, forming a distinct unit.
 - **Patches** where various structures (some or all defined above) are combined in one distinct unit (for example by elevated tissue). This term was previously used by ROELEVELD (1972). In the earlier contribution (LIPINSKI & LESLIE 2018), a term **turret-cluster** was proposed and defined. However, use of this term was found impractical in the reality of small sepiids. With the various degree of preservation of the material, and large natural variability this term was difficult to recognize as such.



All photographs were taken using Canon EOS 7D Mk I camera and Canon EOS 650 camera coupled with Nikon stereomicroscope using a specially engineered ring.

Abbreviations for museums holding material are: B.M. – specimens at NHMUK catalogued prior to 1992; NHMUK – Natural History Museum London, UK; SAIAB – South African Institute of Aquatic

Biodiversity, Grahamstown, South Africa; SAMC – Iziko, South African Museum in Cape Town, South Africa.

There were only six individuals of *S. barosei* sp. nov. in a various degree of preservation. For this reason, not all structures were sufficiently researched, to save precious and fragile material. For example, only one (unsuccessful) attempt to illustrate radula

Table 1. Description of measurements and counts. Definitions follow ROELEVELD (1972), ROELEVELD & LILTVED (1985) and LU & REID (1997)

| Abbreviation | Definition |
|--------------|---|
| AL1–AL4 | Arm Length: length of the right (rt) or left (lt) arm of each designated (I to IV) arm pair, measured from the inner base of the most proximal sucker to the tip of the arm |
| AMH | Anterior Mantle to Head: length of anterior projection of the dorsal mantle margin measured along the midline from the anterior-most point of the dorsal mantle to a transverse line joining the posterior-most points of the dorsal mantle margin on either side of the midline |
| AS1–AS4 | Arm Sucker diameter: diameter of the largest sucker on the right (rt) or left (lt) arm of each designated (I to IV) arm pair |
| ASC1–ASC4 | Arm Sucker Count: total number of suckers on the right (rt) or left (lt) arm of each designated (I to IV) arm pair |
| ASl4 | Arm Sucker left 4: diameter of the largest sucker on the hectocotylosed (left ventral) arm |
| ASl4m | Arm Sucker left 4 min.: diameter of the smallest (modified) sucker on the hectocotylosed arm |
| CES | Club Edge Suckers: number of suckers along the whole edge of the club |
| CIRC | Club Row Count: number of suckers in a single transverse row across the middle of the tentacular club |
| CIS | Club Sucker diameter: diameter of the largest sucker on the tentacular club |
| CS# | Club Sucker count: total number of suckers on a tentacular club |
| CTR# | Club Transverse Row Number: number of transverse rows of suckers on a tentacular club |
| FFu | Free Funnel length: measured from the anterior funnel opening to the dorsal attachment of the funnel to the head |
| Fla | Fin Insertion anterior: distance from the anterior mantle margin to the anterior junction of fin and mantle |
| Flp | Fin Insertion posterior: distance between the posterior junction of the left and right fins with the mantle |
| FL | Fin Length: measured from anterior to posterior insertion along the curve of the mantle at the base of the fin |
| FuL | Funnel Length: measured along the ventral midline from the anterior funnel opening to the posterior margin (the ventral mantle has to be cut to expose the posterior edge of the funnel) |
| FW | Fin Width: measured from the lateral edge of the mantle to the free edge of the fin |
| HcL | Hectocotylus Length: length of the hectocotylosed (left ventral) arm measured from the inner base of the most proximal sucker to the tip of the arm |
| HL | Head Length: from the anterior tip of the nuchal cartilage to the anterior edge of the dorsal interbranchial membrane between the dorsal arms |
| HW | Head Width: the greatest width of the head (generally across the eyes) |
| L | Length of the cuttlebone along the mid-line |
| WL | Width of the cuttlebone (where widest, perpendicular to L) |
| MHL | Modified Hectocotylus Length: of the modified (proximal) portion of the hectocotylus measured from the inner base of the most proximal sucker to the inner base of the first normal sucker |
| ML | Dorsal Mantle Length: measured along the midline from the anterior edge of the dorsal mantle to the posterior end of the mantle |
| MLv | Ventral Mantle Length: measured along the midline from the midpoint of the ventral margin to the posterior end of the mantle |
| Tcl | Tentacular club length: measured from the basal sucker to the tip of the club |
| TL | Tentacle Length: measured from the point of emergence from the tentacular sac to the tip of the club |
| LORC | Transverse Row Count: Number of suckers in a single longitudinal row along the midline of the tentacular club |
| TIP1AL | Tip of Arms I Length: measured from the last distal sucker to the tip of I pair of arms (left, right or both; second measure in parentheses if there is large difference) |

was made. Only two attempts to extract cuttlebone were made, resulting in considerable damage to this extremely fragile structure. Present material was accumulated during demersal surveys. These surveys are labour intensive and there is no time for immediate dissections. Therefore, most specimens are preserved initially in 10% buffered formalin with ample space in the jar, and after variable time (few weeks to few months from the moment of preservation) are transferred to 4% formalin, and then after 24h in water, gradually transferred to 70% ethyl alcohol. This

procedure is sufficient to preserve most structures (even the cuttlebones of large Sepiidae) but insufficient for small sepiids. Some of their cuttlebones are completely de-calcified, however, this is extremely variable for an unknown reason. There are well preserved cuttlebones of small sepiids after months in formalin. The best way to avoid problems is to preserve fresh specimens in weak ethyl alcohol (<50%) only for cuttlebone dissection. This implies however that there must be enough specimens to preserve in formalin for morphological and ecological research.

SYSTEMATIC ACCOUNTS

Digitosepia subgen. nov.

Diagnosis. Sepiids with a substantially modified cuttlebone. Modifications: inner cone reduced to thin band, fused completely to the outer cone (flat); striae moderately or strongly convex. Tips of I p. arms completely devoid of suckers; they may be thin, whip-like, or thick, finger-like with a considerable variation between.

Type species: *Sepia* (*Digitosepia* subgen. nov.) *robsoni* (Massy, 1927)

Sepia (*Digitosepia*) *barosei* sp. nov.

Figs 2–35, Table 2

Holotype. SAIAB 209544: mature male ML 17 mm, TW 1.93 g. R/V Dr Fridtjof Nansen demersal survey 2000405, 28 May 2000, AN0182-034-3606, 34°18.00'S, 24°51.00'E to 34°17.33'S, 24°51.00'E, bottom trawl, 119 m.

Paratypes. NHMUK 20200244: female ML 17 mm ML, TW 1.68 g. R/V Dr Fridtjof Nansen demersal survey 2000401, 23 May 2000, Station AN0161-015-3330 (aborted trawl), 35°57.00'S, 21°48.00'E, bottom trawl, 184 m;

SAMC MB A089309 (label: *Sepia dubia*): female ML 24 mm, TW 2.68 g. S/T Andromeda demersal survey, 09 May 2016, Station 00771-0042-3380, 35°31.15'S, 22°07.07'E, bottom trawl, 171 m;

SAIAB 209545: female 15 mm, 1.25 g, R/V Dr Fridtjof Nansen demersal survey 2000401, 23 May 2000, Station AN0161-015-3330 (aborted trawl), 35°57.00'S, 21°48.00'E, bottom trawl, 184 m;

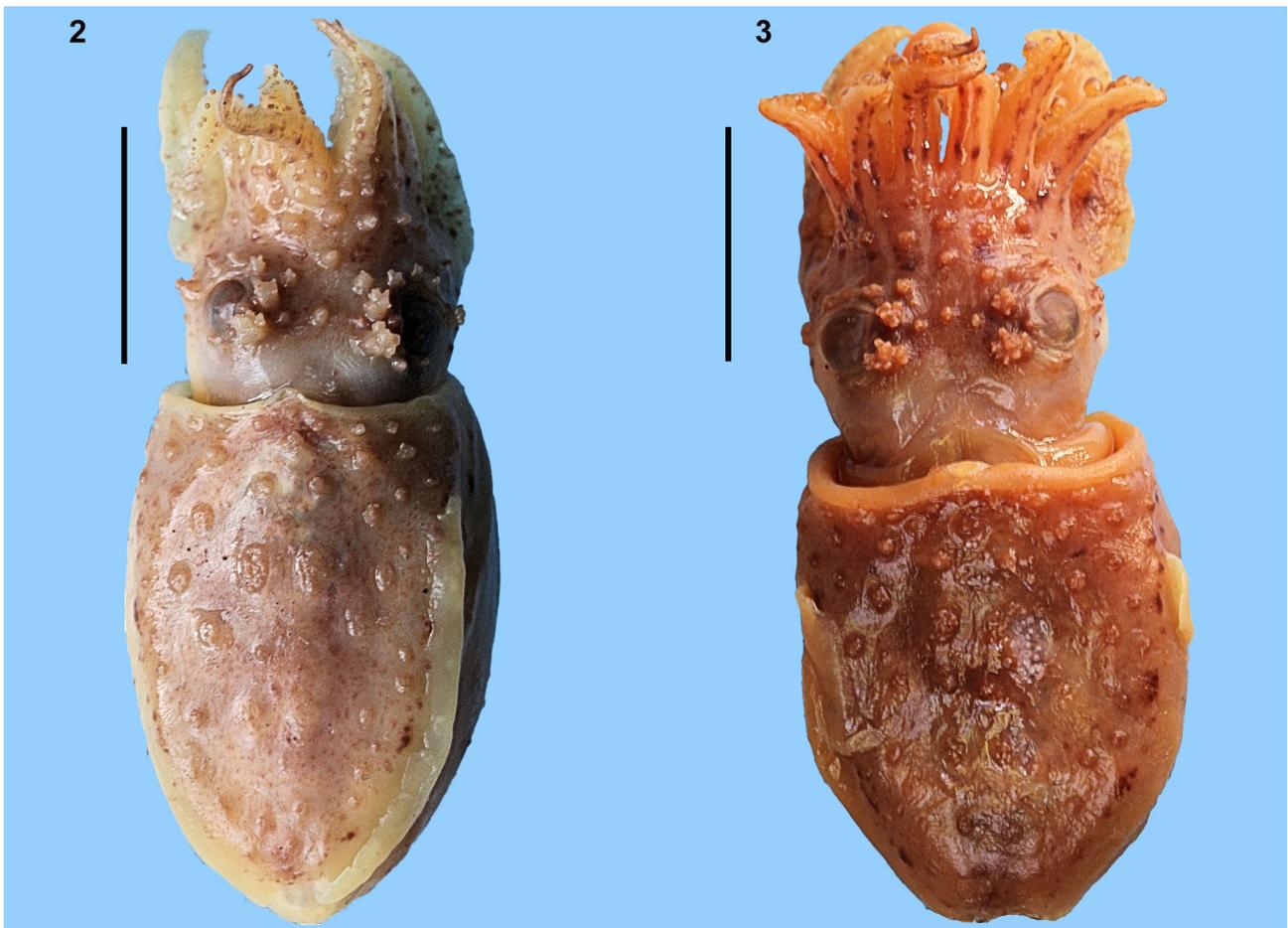
SAIAB 209546: female ML 21 mm, TW 2.62 g and SAIAB 209546: female ML 20 mm TW 2.35 g, R/V Dr Fridtjof Nansen demersal survey 2000401, 21 May 2000, Station AN 0154-010-3131, 36°36.00'S, 20°36.00'E, bottom trawl 183 m.

Diagnosis. Cuttlebone lightly calcified, thin and fragile; anterior part (~25% of length) triangular, rounded; posterior part broad, oval, rounded posteriorly; spine absent; last septum elevated; no mid-dor-

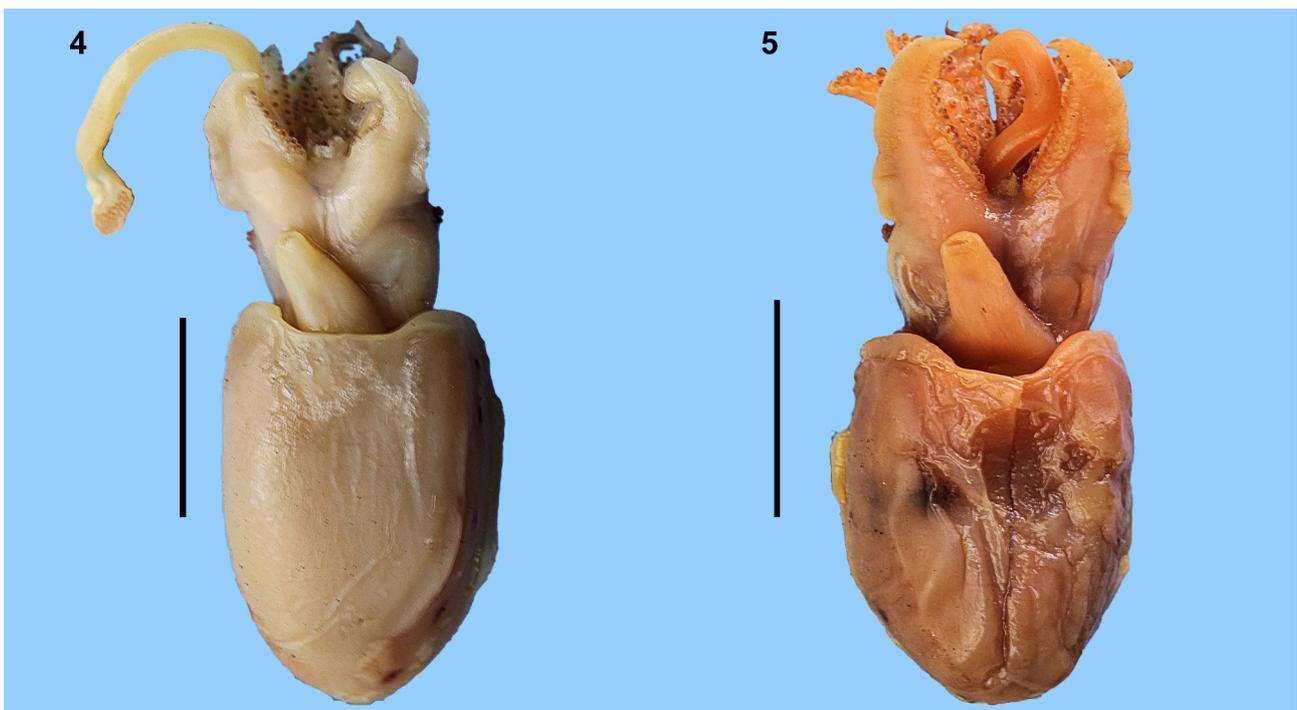
sal longitudinal ridge; phragmocone well defined but very thin, striae borderline slightly convex, other striae convex; inner cone thin, extends anteriorly into striated zone, ventral part reduced; outer cone very broad, width decreasing anteriorly into upper limbs that end close to anterior tip of cuttlebone. Head with four distinct and large turrets dorsally between the eyes (proximal pair larger). Smaller turrets and tubercles anteriorly to the dorsal, large eyes. Dorsal mantle usually with two large patches in the anterior half of the mantle, on each side of the midline. Mantle covered with irregularly placed tubercles and few warts; skin between clusters, tubercles and warts smooth, shiny. Tips of I pair of arms devoid of suckers.

Description. Small species; only available male (mature) 17 mm ML, females (maturity III–V) 15–24 mm ML (Table 2). Mantle rather elongated, oval (rounder in smaller animals), dorso-anterior margin wide Λ -shape (Figs 2–11), ventro-anterior margin emarginated (inverted trapezoid) in both sexes (Figs 4–7). Ventral margins of mantle with distinct keels (Figs 4–5). Fins narrow, ending well before anterior mantle margin (FIa 19–23%; Figs 6–7); there is small gap between fins posteriorly. Colour of dorsal mantle and head of preserved specimens variable, dark grey or reddish brown (Figs 2–11). Skin covered dorsally by various structures (papillae, tubercles and warts); smooth, shiny between structures (Figs 2–11). Skin sculpture species-specific, although quite variable.

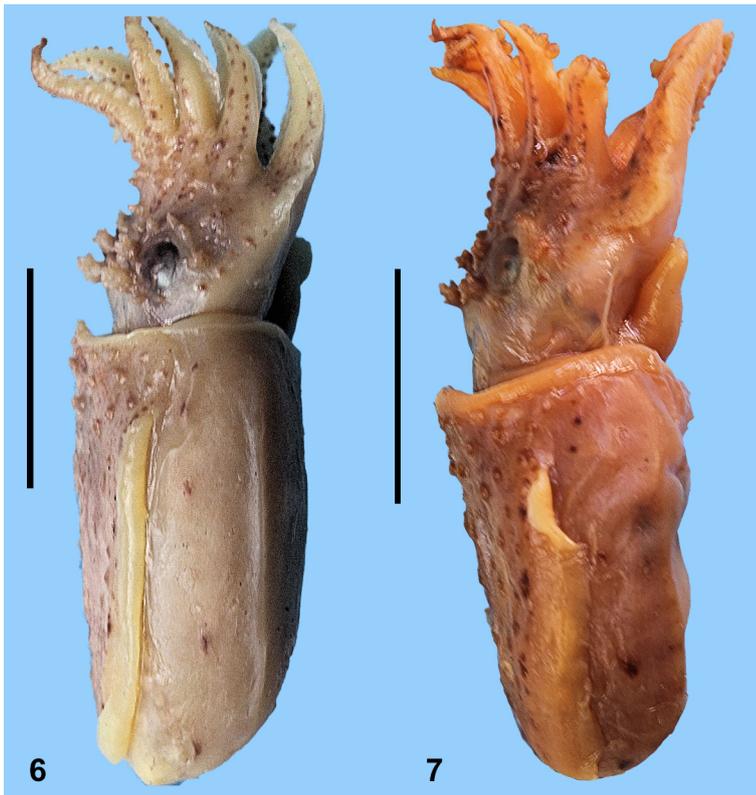
Head width equal to mantle opening width, appears elongated; eyes very large, dorsal (as opposed to lateral or dorso-lateral eyes of most sepiids); neck wide (Figs 2–11). Tentacle pouch large and deep. Buccal membrane without suckers. Four very prominent, long and complicated turrets dorsally on head between eyes, proximal pair larger (Figs 10–11); transverse row of three tubercles between the eyes in occipital region; 2–3 transverse tubercle rows dorsally on head between the eyes and arm bases (some rows may be difficult to see). Three to four small tur-



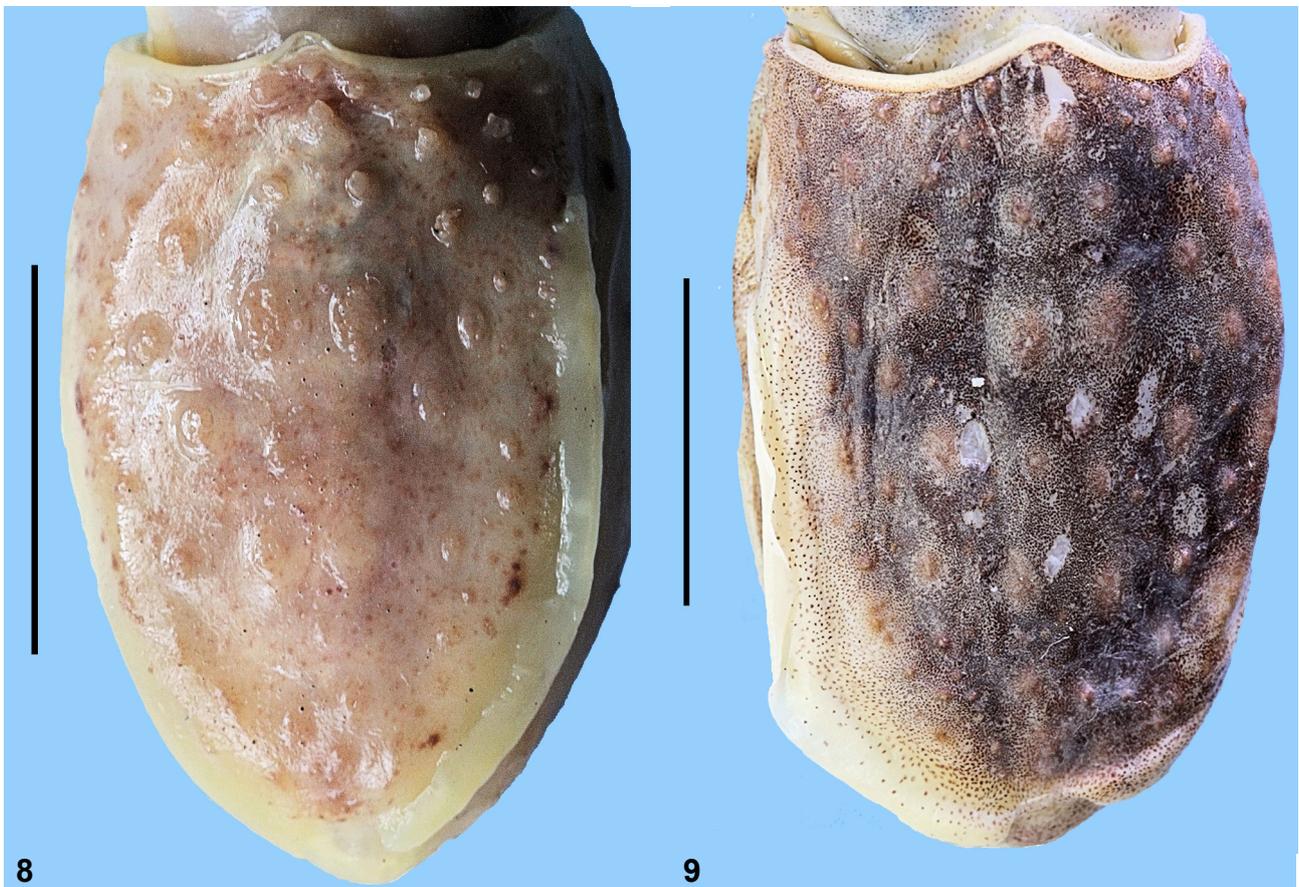
Figs 2–3. Dorsal views of *Sepia barosei* sp. nov.: 2 – SAIAB 209546, female 21 mm ML; 3 – SAIAB 209544, male 17 mm ML, holotype. Scale bars 10 mm



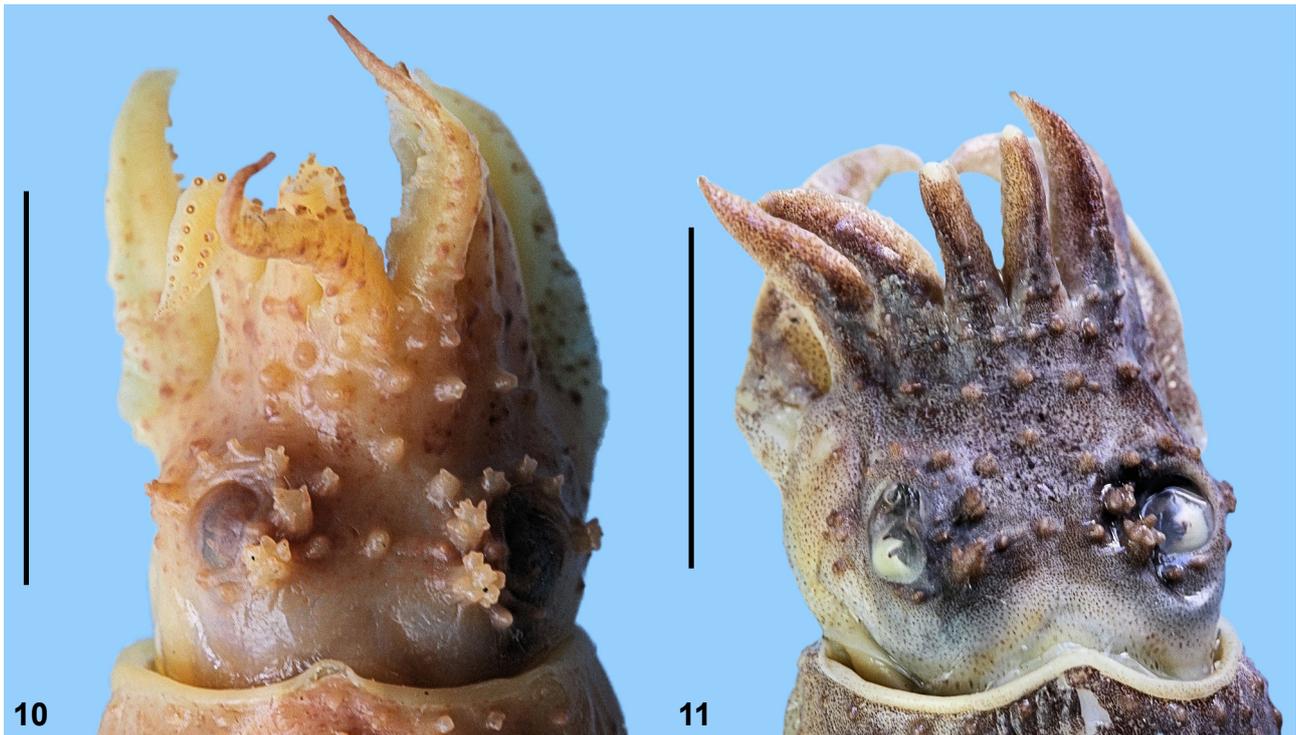
Figs 4–5. Ventral views of *Sepia barosei* sp. nov.: 4 – SAIAB 209546, female 21 mm ML; 5 – SAIAB 209544, male 17 mm ML, holotype. Scale bars 10 mm



Figs 6–7. Lateral views of *Sepia barosei* sp. nov.:
6 – SAIAB 209546, female 21 mm ML; 7 –
SAIAB 209544, male 17 mm ML, holotype.
Scale bars 10 mm



Figs 8–9. Mantles of *Sepia barosei* sp. nov.: 8 – SAIAB 209546, female 21 mm ML; 9 – SAMC MB A089309, female 24 mm ML. Scale bars 10 mm



Figs 10–11. Dorsal aspect of the heads of *Sepia barosei* sp. nov.: 10 – SAIAB 209546, female 21 mm ML; 11 – SAMC MB A089309, female 24 mm ML. Scale bars 10 mm

rets immediately anterior to the eyes. One to three small tubercles at the bases of arms I–III. Three–four small tubercles in a row on each side of the head (Figs 6–7, 10–11). Two large patches dorsally on each side of the midline in about one-third of mantle (anteriorly) and two others (smaller) in about one-third posteriorly (Figs 2, 8–9). Anterior part of the dorsal mantle covered with tubercles in a regular pattern: near the margin, nine small tubercles in a convex row, next convex row comprised of five larger tubercles (median largest), and the last convex row comprised of eight tubercles of variable size. Posterior part of

the mantle also sparsely covered in rather irregularly placed tubercles and a few warts (Figs 2, 8–9).

Arms robust, stout, variable in length (Figs 12–13), relatively short, strong membrane joining pair I proximally for about 20–22% of arm length, membrane becoming gradually shallower between subsequent arms, absent ventrally between arms IV. Protective membranes well developed, fleshy (Figs 12–13). Suckers globose, biserial on all arms; sucker rows widely spaced in both sexes (Figs 12–13). Sucker rings on club and arms smooth (Fig. 14). Tips of arms of I pair devoid of suckers; these tips are quite variable and may be of different length on each arm (range 12–25% of I pair arm length) (Figs 15–16). Arms and especially their armature modified in ma-



Figs 12–13. Arms of *Sepia barosei* sp. nov.: 12 – NHMUK 20200244, female 17 mm ML; 13 – SAIAB 209544, male 17 mm ML, holotype. Scale bars 4 mm

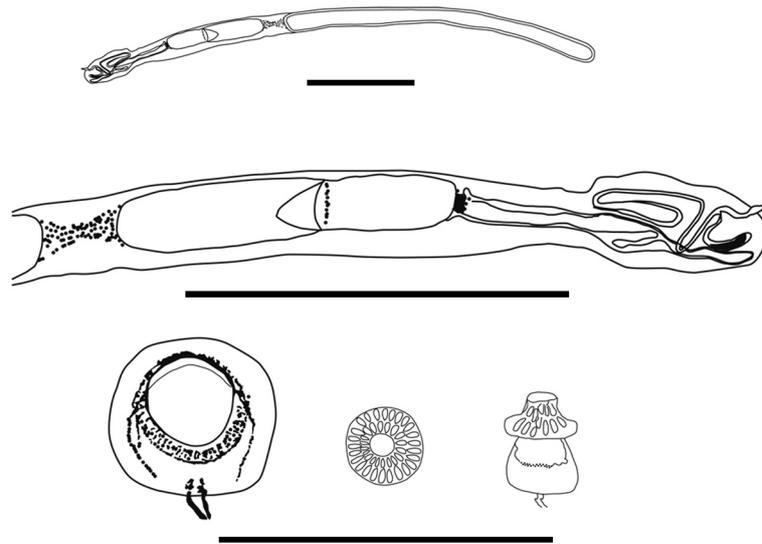
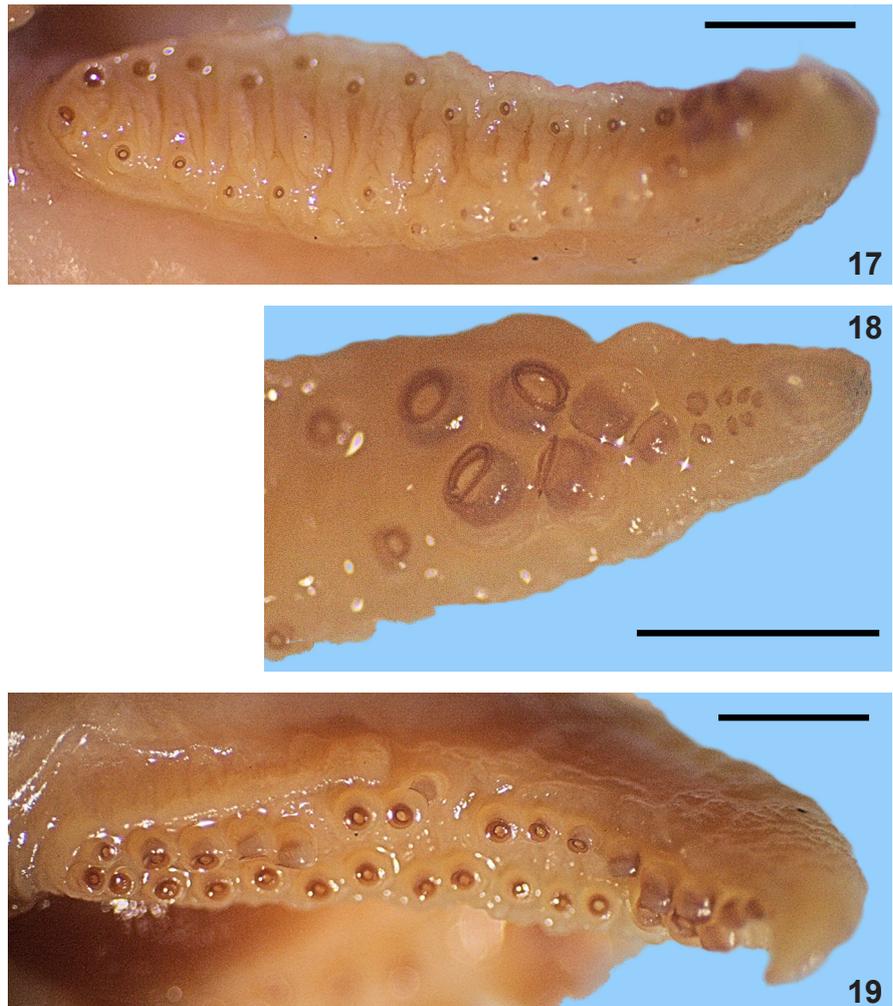


Fig. 14. Spermatophore and suckers of *Sepia barosei* sp. nov. Upper row: spermatophore, SAIAB 209544. Holotype, male 17 mm ML. Middle row: anterior part of the spermatophore enlarged. Bottom row left: sucker, arm IV 3rd pair from the base; and right: club sucker (view from above and from the side), middle of the central transverse row, all suckers from NHMUK 20200244, female 17 mm ML. Scale bars 0.5 mm



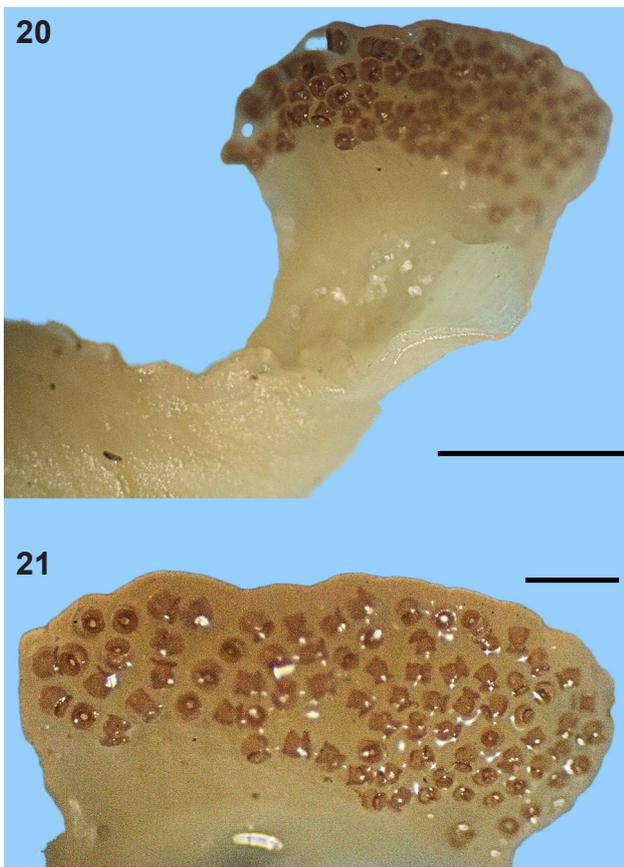
Figs 15–16. Tips of I pair of arms of *Sepia barosei* sp. nov.: 15 – SAIAB 209546b, female 20 mm ML; 16 – NHMUK 20200244, female 17 mm ML. Scale bars 1 mm



Figs 17–19. Modified arms IV pair of *Sepia barosei* sp. nov. holotype, SAIAB 209544, male 17 mm ML: 17 – hectocotylus; 18 – tip of the hectocotylus; 19 – right arm of IV p. Scale bars 1.5 mm

ture males, sub-distal suckers (3 pairs, in single male available) enlarged on arms II–III (Fig. 13). Left ventral arm IV hectocotylised (Figs 17–18): there are 11 pairs of small marginal suckers, gradually becoming smaller from the base. Aboral edge suckers are larger; first three in a straight line and then irregular zigzag pattern. Oral edge suckers smaller, in a straight line. Then there are 4 pairs of enlarged suckers with fine dentitions; hectocotylus tip with biserial small suckers (Fig. 18); fleshy transverse folds running between small marginal sucker pairs (Fig. 17). Right ventral arm also modified (Fig. 19), sucker arrangement from base to tip: eleven pairs of normal biserial suckers (not enlarged); 4 rows of enlarged biserial suckers; 6–10 rows of tiny biserial suckers to tip.

Tentacular stalk moderately long (90–133% ML), club moderate (12–21% ML) (Figs 20–21) with subequal small suckers in 15–16 transverse rows of 6–8 suckers each. Protective membranes very narrow, well separated. Natatory membrane well developed, continuing along tentacular stalk for about 1.5 of club length. Club appears not as a continuation of a tentacular stalk, but perpendicular to it (Fig. 20).

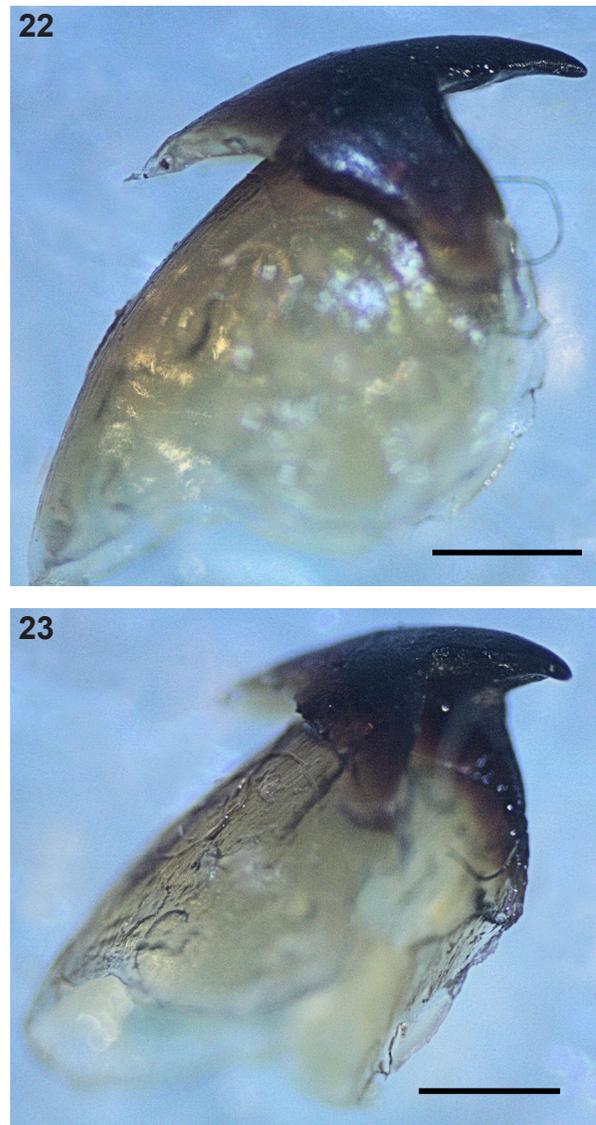


Figs 20–21. Ventral views of the club of *Sepia barosei* sp. nov. SAIAB 209546b, female 20 mm ML: 20 – natatory membrane and distal part of the tentacular stalk; 21 – club suckers. Scale bars 1.5 mm (20) and 0.5 mm (21)

Beaks small, fragile, of typical sepiid proportions. Upper beak (Figs 22–23): rostrum blunt, relatively long, slightly hooked, length greater than width, rostrum angle very little curved; hood high above crest posteriorly; jaw edge straight, jaw angle nearly 90°; lateral wall posterior edge strongly curved; only rostrum and hood dark. Lower beak (Figs 24–26): rostrum short, blunt, jaw angle rounded, broad, >90°, cutting edge wavy; hood low on crest; crest slightly curved; crest and lower edge of lateral wall at broad angle; posterior edge of lateral wall rounded; only rostrum, anterior part of hood and anterior part of shoulders dark.

Radula simple homodont but lost in preparation and cannot be adequately illustrated.

Spermatophores (Fig. 14) do not appear to have species-specific characteristics (illustrated for the re-



Figs 22–23. Upper beak of *Sepia barosei* sp. nov.: SAMC MB A089309, female 24 mm ML, various aspects: 22 – lateral (profile); 23 – oblique. Scale bars 1 mm



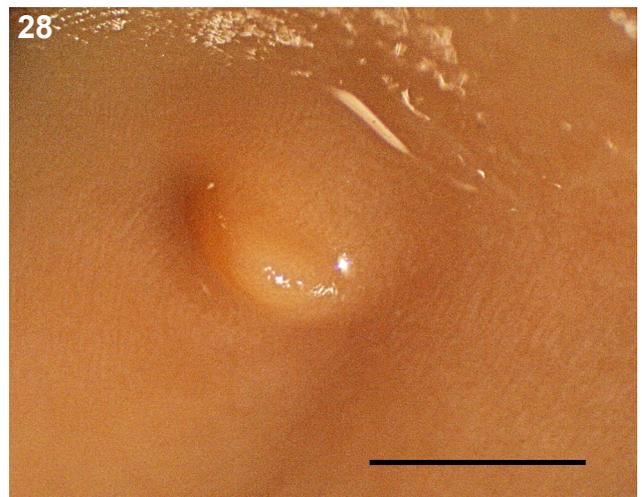
Figs 24–26. Lower beak of *Sepia barosei* sp. nov.: SAMC MB A089309, female 24 mm ML, various aspects: 24 – oblique 1; 25 – oblique 2; 26 – frontal. Scale bars 1 mm

cord in aid of more detailed comparative future research).

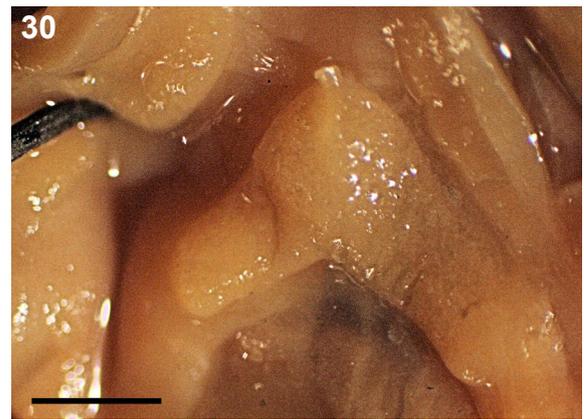
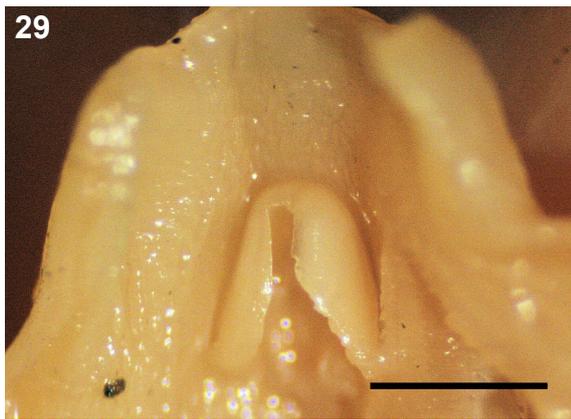
Locking cartilages: funnel component semi-oval, with internal margin almost straight (Fig. 27), groove not very deep, simple, without additional median cleft; mantle component simple, not prominent (Fig. 28).

Funnel with valve (Fig. 29). Funnel organ well defined: dorsal part with weak anterior ridge and papilla; arms relatively long, thick and fleshy; ventral part simple, elongated oval (Fig. 30).

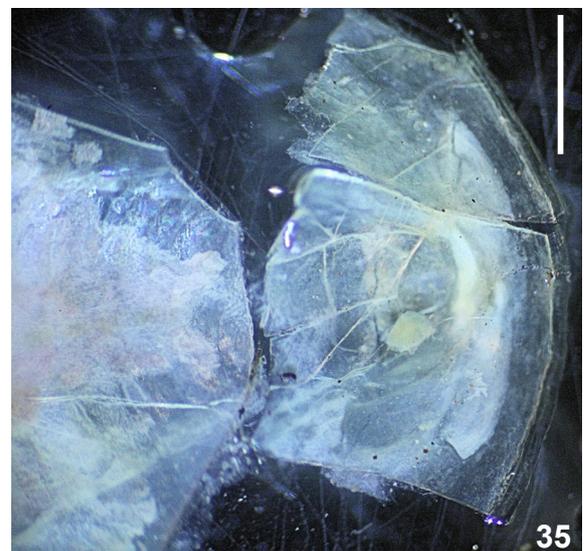
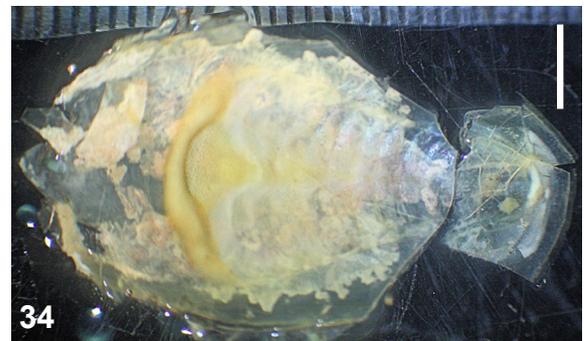
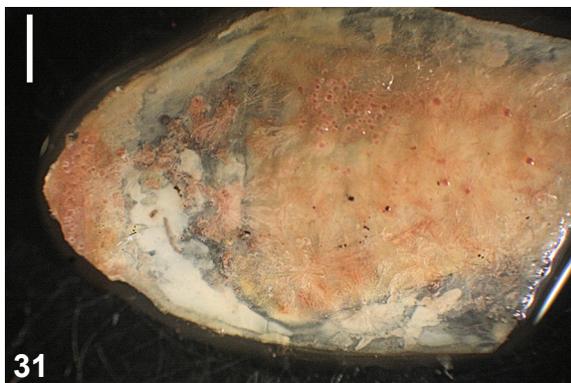
Cuttlebone: lightly calcified, thin and extremely fragile; anterior 25% triangular and rounded; broad, oval and round posteriorly (Figs 31–35); spine absent. Last septum elevated, stronger calcified than others. Phragmocone well defined, striae borderline clearly convex. Inner cone thin, anteriorly extends



Figs 27–28. Funnel and mantle cartilages of the funnel/mantle locking mechanism of *Sepia barosei* sp. nov.: female 17 mm ML; 27 – funnel component; 28 – mantle component. Scale bars 1.5 mm



Figs 29–30. Funnel valve and funnel organ of *Sepia barosei* sp. nov.: NHMUK 20200244, female 17 mm ML; 29 – funnel valve; 30 – funnel organ (both components). Scale bars 1 mm



Figs 31–35. Cuttlebone of *Sepia barosei* sp. nov.: 31, 32 – SAIAB 209546a, female 21 mm ML (31 – dorsal view, 32 – ventral view); 33–35 – SAIAB 209545, female 15 mm ML (33 – dorsal view, 34 – ventral view, 35 – ventral view of the proximal part of the inner and outer cone, enlargement). Scale bars 2 mm (31–34) and 1.5 mm (35)



Table 2. Measurements (mm), weight (g) and counts recorded for characters of the holotype and all other individuals of *S. barosei* sp. nov.

| Catalogue number | SAIAB 209544 Holotype | NHMUK 20200244 | SAMC MB A089309 | SAIAB 209545 | SAIAB 209546a | SAIAB 209546b |
|------------------|-----------------------|----------------|-----------------|--------------|---------------|---------------|
| Sex | M | F | F | F | F | F |
| Maturity | V | V | IV | III | V | * |
| Weight | 1.93 | 1.68 | 2.68 | 1.25 | 2.62 | 2.35 |
| ML | 17 | 17 | 24 | 15 | 21 | 20 |
| MLv | 15 | 15 | 23 | 14 | 19.5 | 19 |
| L | * | * | * | 15 | *19 | * |
| WL | * | * | * | *8 | 10.5 | * |
| HL | 9 | 9 | 11 | 7 | 9.5 | 9.5 |
| HW | 9.5 | 8.5 | 11 | 8.5 | 10 | 9.5 |
| AMH | 1 | 1.5 | 1.5 | 1 | * | 2 |
| FL | 13 | 14 | 18.5 | 12 | 18 | 17 |
| FW | 2 | 1.5 | 2 | 1.5 | 1.5 | 1.5 |
| Fla | 4 | 3.5 | 5 | 3.5 | 4 | 4.5 |
| Flp | 2.5 | 1.5 | 2.5 | 2 | * | 1 |
| FFu | 4 | 4 | 3 | 3.5 | 5 | 4 |
| FuL | 8.5 | 8.5 | 10 | 8 | * | * |
| AL1-rt | * | 8 | * | 7 | 9 | 8 |
| AL2-rt | 7.5 | 6.5 | 8 | 6.5 | 7 | 7 |
| AL3-rt | 7.5 | 7 | 8.5 | 7.5 | 8 | 7.5 |
| AL4-rt | 8 | 7.5 | 9 | 7.5 | 9 | 5.5 |
| HcL | 9 | — | — | — | — | — |
| MHL | 5 | — | — | — | — | — |
| TIP1AL | * | 1.4 | * | 1.1 | 1.1 | 2 |
| TL | 13 | 20 | 29 | 20 | 19 | 24 |
| Tcl | 2.5 | 3 | 3 | 3.2 | 3 | 3.2 |
| AS1-rt | 0.8 | 0.35 | 0.35 | 0.5 | 0.45 | 0.45 |
| AS2-rt | 0.7 | 0.4 | 0.45 | 0.45 | 0.5 | 0.5 |
| AS3-rt | 0.7 | 0.3 | 0.4 | 0.4 | 0.5 | 0.4 |
| AS4-rt | 0.45 | 0.3 | 0.35 | 0.35 | 0.4 | 0.4 |
| ASl4 | 0.5 | — | — | — | — | — |
| ASl4m | 0.2 | — | — | — | — | — |
| CIS | 0.1 | 0.15 | 0.1 | 0.1 | 0.15 | 0.15 |
| ASC1-rt | 18 | 22 | * | 24 | 23 | 17 |
| ASC2-rt | 20 | 29 | 33 | 30 | 30 | 34 |
| ASC3-rt | 20 | 27 | 34 | 38 | 32 | 32 |
| ASC4-rt | 32 | 34 | 38 | 42 | 38 | 34 |
| CS# | 65 | 78 | 70 | 94 | 68 | 74 |
| CTR# | * | 15 | * | 16 | 15 | 16 |
| CES | 32 | 34 | 39 | 42 | 30 | 34 |
| CIRC | 6 | 6 | 6 | 7 | 8 | 7 |
| LORC | 14 | 18 | 17 | 19 | 12 | 16 |

— – not applicable

* – not possible to measure/estimate

*number – approximate



Figs 36–37. Cuttlebone of *Sepia typica*, male 22 mm ML: 36 – ventral view; 37 – dorsal view. Scale bars 10 mm

into striated zone, ventral portion reduced. Outer cone extremely broad, very thin, its width decreasing anteriorly into upper limbs that end close to anterior tip of cuttlebone. This description is preliminary due to the serious damage to the available material during preparation; however, it allows to appreciate unique character of this structure.

Remarks. In the small size range investigated this small species is sexually mature at 17 mm ML (both sexes). Juveniles have not been recorded. The holotype (Figs 2–7) and at least two of the paratypes are mature.

Sepia barosei sp. nov. is distinguished from all other small sepiids described so far by the array of the following characters. The absence of ventral pores (present in *S. typica*), tips of I pair of arms devoid of suckers, which is easily seen despite the small size of the species (normal suckers to the end in *S. pulchra* Roeleveld et Liltved, 1985, *S. shazae* Lipinski et Leslie, 2018, *S. dubia* Adam et Rees, 1966), dorsal mantle and head full of various structures (smooth in *S. rosoni* (Massy, 1927)), dorsal skin neither covered in dense tubercles with no other structures (as in *S. faurei* Roeleveld, 1972) nor dense warts with no other structures except two large tubercles on the dorsal head and one on mantle (as in *S. roeleveldi* sp. nov.).

It is perceived that each of these species differs rather profoundly from all others by the cuttlebone characteristics. However, this needs to be investi-

gated, described and illustrated by separate studies. Cuttlebones of all small sepiids are very difficult to dissect without damaging them because of their great fragility. Even if successful, this yields usually limited information because calcium carbonate component of these cuttlebones gets easily dissolved or damaged in most preservative solutions (and, it is suspected, may get damaged shortly after death of the animal in any conditions). The only solution is to dissect the cuttlebone immediately after capture, which is seldom possible. This is why cuttlebone descriptions provided in this paper must be taken with caution as preliminary. The picture of the cuttlebone of *S. typica* (Figs 36–37) is provided for comparison with *S. barosei* sp. nov. Interpretation of this comparison is that *S. typica* still has a proper phragmocone and almost straight striae of which first is the thickest, whereas in *S. barosei* the striae are much reduced (although the available material is seriously damaged).

Distribution. *S. barosei* is probably endemic to South Africa, it is known only from an eastern Agulhas Bank on the bottom, depth range 119–184 m. Holotype of *S. barosei* was found in the same trawl as an individual of *S. dubia*, described by LIPINSKI & LESLIE (2018).

Etymology. *Sepia barosei* is named to honour the late Mr. Barry Rose, for many years Chief Technician in then the Sea Fisheries Research Institute, Cape Town, South Africa.

***Sepia (Digitosepia) roeleveldi* sp. nov.**
(Figs 38–83, Table 3)

Holotype. SAIAB 209547: mature male, 26 mm ML, TW 6.35 g. R/V Dr Fridtjof Nansen demersal survey 2010401, 06 Feb. 2010, Station 142, 32°52.52'S, 17°21.00'E, bottom trawl 303 m.

Paratypes. NHMUK 20200245: female 30 mm ML, TW 7.27 g. NHMUK 20200246: Female 32 mm ML, TW 7.91 g (without cuttlebone) (mature). R/V Dr Fridtjof Nansen demersal survey 2008401, 09 Feb. 2008, Station 1527, 33°04.17'S, 17°31.13'E, bottom trawl 345 m.

SAMC S2800: female 32 mm ML, TW 7.58 g (mature). RS Africana demersal survey, 04 May 1993, Station A14839-111-087-4159, 34°53.00'S, 23°38.00'E, bottom trawl 230 m.

SAMC MB A089322 (label: *S. faurei*, det M. Lipinski): female 34 mm ML, TW 11.28 (mature). RS Africana demersal survey, 16 Feb. 2016, Station 069, 34°16.04'S, 26°34.01'E, bottom trawl 423–433 m.

SAMC MB A089307 (label: *S. faurei*): female 28 mm ML, TW 4.92 g (mature). MT Andromeda demersal survey, 13 Feb. 2015, Station 015-4011, 36°31.02'S, 20°14.04'E, bottom trawl 328–315 m.

SAIAB 209548: a) female 25 mm ML, TW 4.64 g (maturity not checked); b) male 25 mm, TW 3.51 g. R/V Dr Fridtjof Nansen demersal survey 2008401, 12 Feb. 2008, Station 1543, 34°19.08'S, 18°12.04'E, bottom trawl 288 m.

SAIAB 209549: a) female 27 mm ML, TW 7.21 g (maturity IV); b) female 28 mm ML, TW 5.79 g (maturity IV); c) female 36 mm ML, TW 10.0 g (maturity IV); d) also head only (female; maturity undetermined). RS Africana demersal survey, 28 June 1991, Station A11965-093-063-4216, 34°22.00'S, 26°17.00'E, bottom trawl 280 m.

SAIAB 209550: female 33 mm ML, TW 9.42 g (without cuttlebone; mature, fertilized). R/V Dr Fridtjof Nansen demersal survey 2005401, 04 March 2005, Station 1084-133, 34°19.03'S, 18°11.00'E, bottom trawl 281 m.

SAIAB 209551: female 33 mm ML, TW 12.33 g (maturity not determined). MT Andromeda demersal survey AND003, 12 Jan. 2014, Station D00321-071-6612, 34°47.02'S, 24°49.09'E, bottom trawl 497 m.

SAIAB 209552: female 29 mm ML, TW 7.84 g (without cuttlebone) (mature). R/V Dr Fridtjof Nansen demersal survey 2010401, 04 Feb. 2010, Station 128, 34°19.40'S, 18°11.90'E, bottom trawl 286 m.

SAIAB 209553: female 30 mm ML, TW 7.27 g (mature). RS Africana demersal survey, 16 September 2001, Station A20076-160-045, 34°52.00'S, 23°32.00'E, bottom trawl 181 m.

SAIAB 209555: female 34 mm ML (estimate, mutilated specimen). No weight recorded. Mature. R/V Dr Fridtjof Nansen demersal survey 2007401, 11 Jan.

2007, Station 1289, 34°38.00'S, 18°18.67'E, bottom trawl 407 m.

SAIAB 209554: a) male 28 mm ML, TW 5.12 g; b) male 28 mm ML, TW 5.74 g (maturity not checked in both specimens). R/V Dr Fridtjof Nansen demersal survey 2003401, 20 Jan. 2003, Station AN560-044-3179, 31°02.00'S, 16°45.00'E, bottom trawl 313 m.

SAIAB 209556: male 23 mm ML, TW 3.24 g (maturity not checked). R/V Dr Fridtjof Nansen demersal survey 2006401, 22 Feb. 2006, Station N1271, 30°55.98'S, 16°25.98'E, bottom trawl 275 m.

SAIAB 209557: male 25 mm ML, TW 4.34 g (maturity not checked). R/V Dr Fridtjof Nansen demersal survey 2012401, 05 Feb. 2012, Station 47, 33°05.31'S, 17°30.93'E, bottom trawl 334 m.

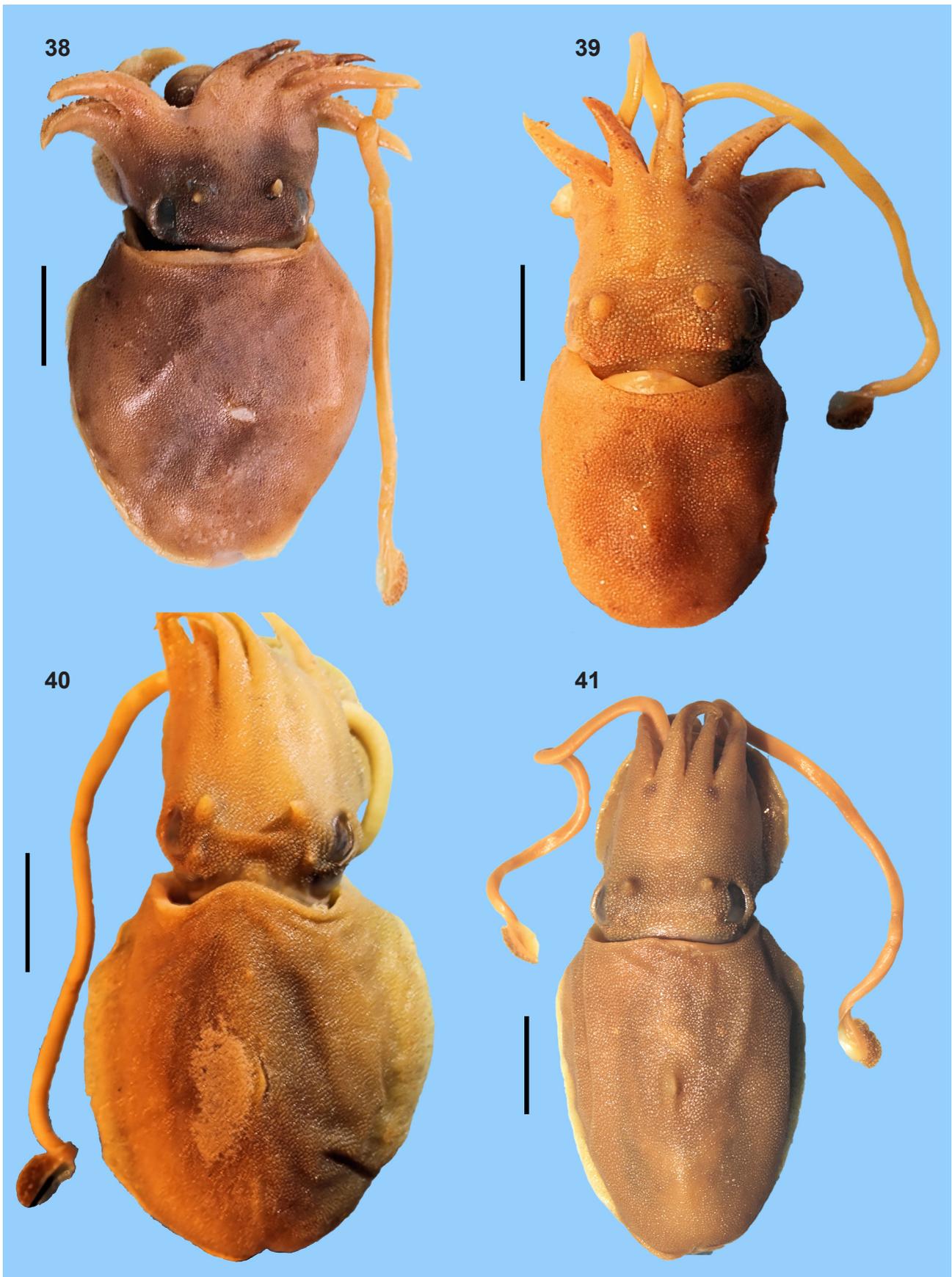
SAIAB 209558: a) female 32 mm ML, TW 8.80 g; b) male 25 mm ML, TW 3.53 g (maturity not checked). RS Africana demersal survey, 16 September 2001, Station A20075-160-044-4150, 34°55.00'S, 23°17.00'E, bottom trawl 208 m.

SAIAB 209559: female 32 mm ML, TW 10.01 g (mature); male 31 mm ML (estimated), TW >7 g (estimated; specimen mutilated); both mature, RS Africana demersal survey, 03 April 1993, Station A13337-102-012-4216, 34°23.00'S, 26°16.00'E, bottom trawl 316 m.

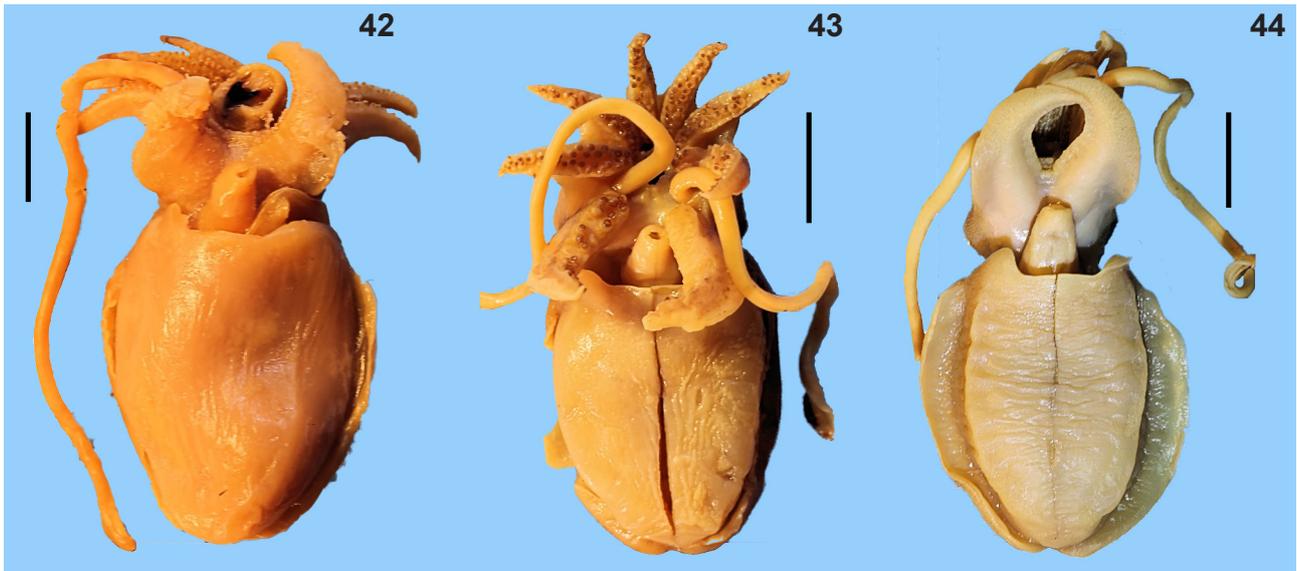
Diagnosis. Cuttlebone reduced: striae of the remnants of the phragmocone are extremely convex and appear mixed with layers of growth of the dorsal shield. Cuttlebone broad, especially outer cone; anterior oval; posterior spine absent. Inner cone distinct but completely fused (including limbs) with outer cone; together with posterior outer cone forms shallow spoon-shaped depression (shallow pocket). There is evidence (Fig. 70) of small posterior wings of outer cone.

Dorsal mantle, head and arms covered densely and completely with small flat warts, giving a scale-like appearance. Two long conical tubercles (also covered with these warts) on the head between and anteriorly to dorso-lateral eyes. Tips of I pair of arms devoid of suckers.

Description. Small but relatively heavy, known at present from 17 females, ML 25–36 mm (mean 31 mm) and 8 males, ML 23–31 mm (mean 26 mm) (Figs 38–46, Table 3). Overall habitus: globose, compact, round, dorsal skin uniformly warty. Mantle broad oval, length to width ratio 1.2–1.4; antero-dorsal margin variable: flat or even concave, or wide “W” type; antero-ventral margin emarginated inverted trapezoid in both sexes, variation not detected (Figs 42–44). Fins robust and wide (up to 13% ML) ending well before anterior mantle margin (Fla 13–18%; Figs 44, 45); small gap posteriorly between fins. Colour of dorsal mantle, head and arms in preservative solution uniform, reddish brown.



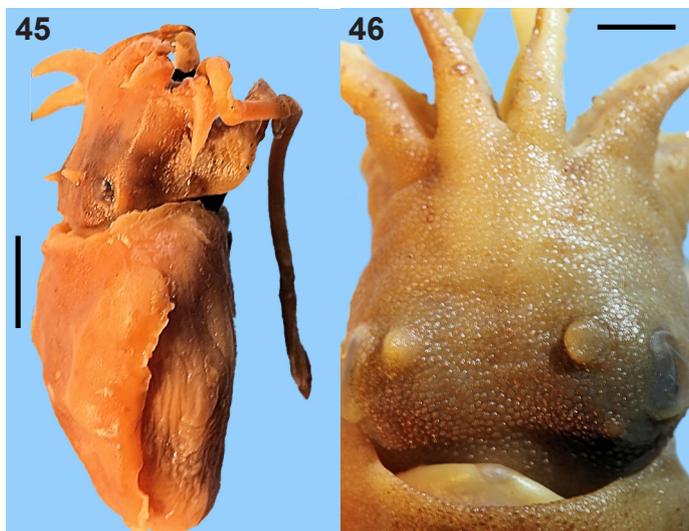
Figs 38–41. Dorsal views of *Sepia roeleveldi* sp. nov.: 38 – SAIAB 209551, female 33 mm ML; 39 – SAIAB 209547, male 26 mm ML, holotype; 40 – SAIAB 209553, female 30 mm ML; 41 – SAIAB 209558a, female 32 mm ML. Scale bars 10 mm



Figs 42–44. Ventral views of *Sepia roeleveldi* sp. nov.: 42 – SAIAB 209551, female ML 33 mm; 43 – SAIAB 209547, male 26 mm, holotype; 44 – SAIAB 209553, female ML 30 mm. Scale bars 10 mm

Dorsal mantle, head and arms very densely covered with small, flat warts, giving them a “scaly” appearance (Figs 38–41, 46, 72). However, these warts do not resemble scales at all (Figs 46, 72). In some individuals these warts are present on marginal parts of ventral mantle. Ventral mantle with distinct keels (Figs 42–44); in some cuttlefishes fleshy wrinkled tissue, on margins and posteriorly, forms an adhesive pad. There may be one low but broad tubercle in the middle of dorsal mantle (Fig. 41); it is missing in some specimens. Head robust, neck usually only slightly narrower than head (but see Fig. 40); there are two long, conical tubercles (also covered by warts; Figs 41, 46) anteriorly to the dorso-lateral eyes (towards the midline). Two similar smaller tubercles (Figs 41, 46) may be present in some specimens in line behind the first pair (posterior to the eyes).

Arms II–III pair are mostly subequal in length, arms IV are longest and I are shortest (based upon 25 individuals, eight of which were measured). Arms are relatively short, fleshy; keels especially prominent in ventral (IV) arms; on other arms their presence is variable (Figs 38–49) and depends upon the state of preservation and possibly other factors. Protective membranes thick, fleshy; suckers biserial (in males, they may appear tetraserial on arms II–III (Figs 48–49) because of their zigzag distribution. Arms connected by membrane; slightly less than 1/3 of arm length between arms I and I–II; strongest between arms II–III; no web between arms III–IV and IV. Suckers on arms relatively large; sucker rings with no teeth (Fig. 50). Tips of arms of I pair devoid of suckers; these tips are quite variable and may be of different length on each arm (range 4–17 % of arm length) (Figs 51–54).



Figs 45–46. *Sepia roeleveldi* sp. nov.: 45 – lateral view, SAIAB 209551, female 33 mm ML; 46 – dorsal view of the head, SAIAB 209547, male 26 mm ML, holotype. Scale bars 10 mm



Figs 47–49. Arms of *Sepia roeleveldi* sp. nov.: 47 – SAIAB 209548a, female 25 mm ML; 48 – SAIAB 209554a, male 28 mm ML; 49 – SAIAB 209547, male 26 mm ML, holotype. Scale bars 10 mm (47), 5 mm (48) and 3 mm (49)

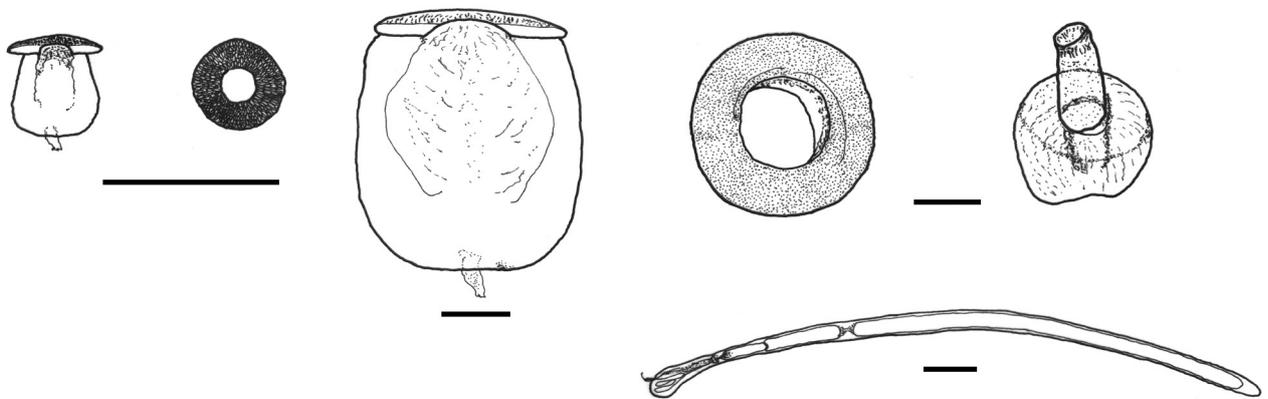


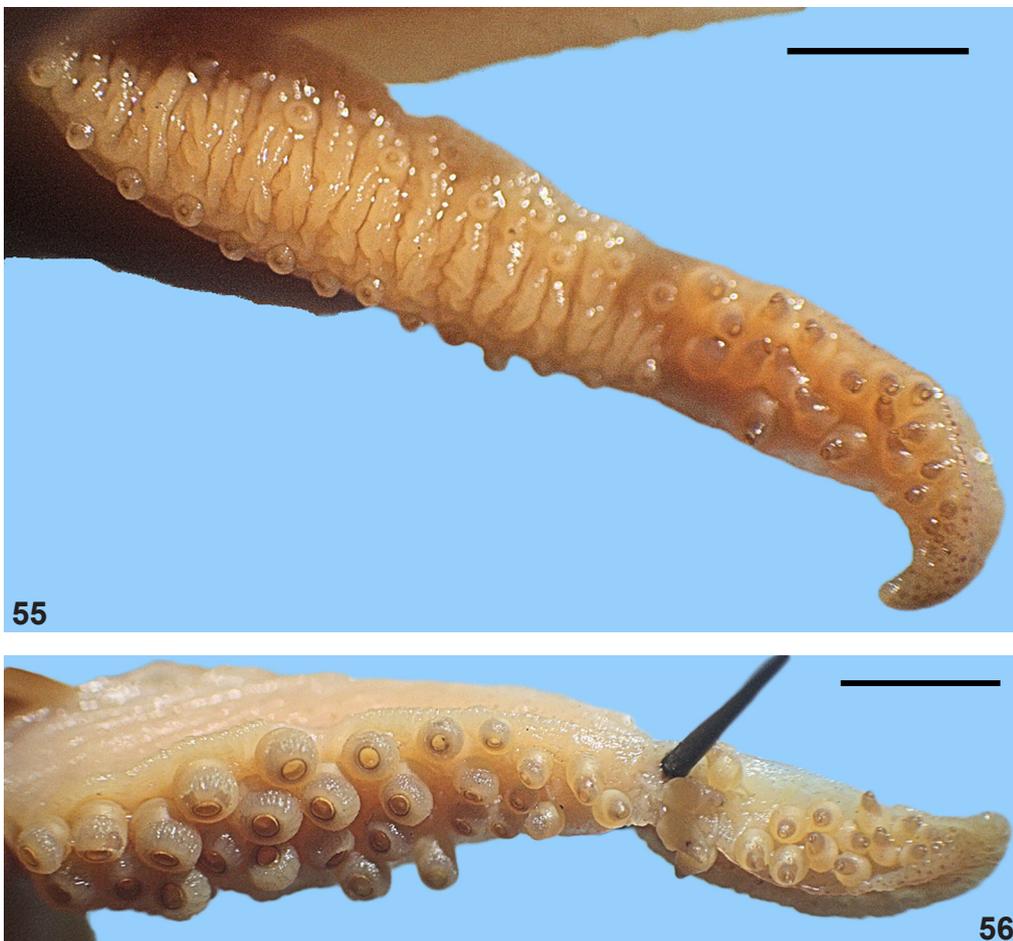
Fig. 50. Details of suckers and a spermatophore of *Sepia roeleveldi* sp. nov. Upper row (from left): club sucker (middle of the central transverse row, section and view from above), arms IV pair 3rd pair from the base (section and view from above), arms I pair 6th pair from top (view from the side), all suckers from SAIAB 209553; bottom right: spermatophore, SAIAB 209559b. Scale bars 0.3 mm



Figs 51–54. Tips of arms I pair, variability in *Sepia roeleveldi* sp. nov.: 51 – SAIAB 209548a, female 25 mm ML; 52 – SAIAB 209553, female 30 mm ML; 53 – SAIAB 209551, female 33 mm ML; 54 – SAIAB 209547, male 26 mm ML, holotype. Scale bars 1.5 mm (51, 54), 0.5 mm (52) and 1 mm (53)

Arms of males modified (Figs 48–49): all suckers enlarged, especially distal suckers of arms I–II. Distal suckers of arms I–III instead of chitinous rings, have long, relatively narrow tubes (Figs 48–50). Left ventral arm hectocotylosed (Fig. 55): there are 13 pairs of medium-sized suckers in marginal rows. First three aboral edge suckers in a straight line and then in regular zigzag pattern. Oral edge suckers of same size, in a straight line. Then there are 7 pairs of enlarged suckers with long chitinous tubes (except proximal three suckers) instead of rings; hectocotylus tip with 3 pairs of smaller suckers; fleshy transverse folds running between smaller marginal sucker pairs. Right ventral arm also modified (Fig. 56), sucker arrangement from base to tip: thirteen pairs of enlarged biserial suckers (they appear tetraserial due to their zigzag distribution) with normal chitinous rings; then 10–11 rows of enlarged biserial suckers with tubular chitinous rings, gradually becoming smaller.

Tentacular stalk long (171–212% ML). Club relatively large (16–21% ML), uniform with 13–18 rows of 4–5 suckers (Fig. 57). Suckers minute, chitinous rings mostly smooth but tiny indentation seen on some (Fig. 50). Protective membranes narrow. Natatory membrane well developed, continues along the tentacular stalk for about $\frac{1}{2}$ of club length.



Figs 55–56. Modified arms IV pair in males of *Sepia roeleveldi* sp. nov. SAIAB 209558b, male 25 mm ML: 55 – hectocotylus; 56 – right arm IV. Scale bars 2 mm

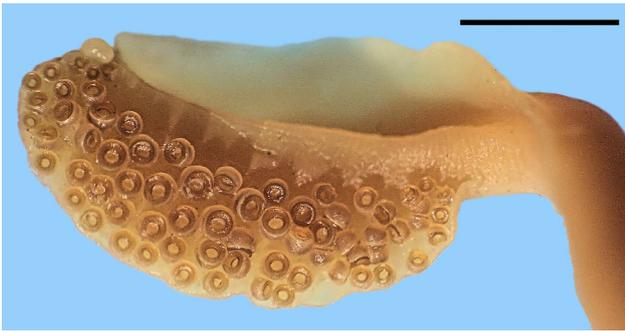
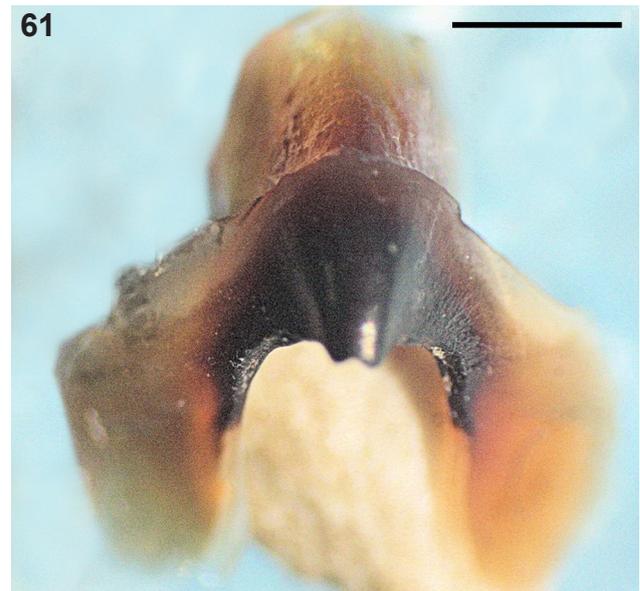
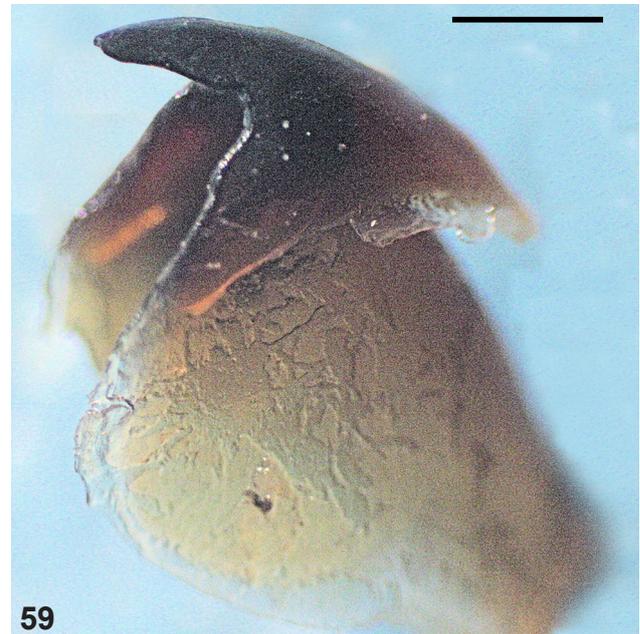


Fig. 57. Club and a distal part of tentacular stalk of *Sepia roeleveldi* sp. nov., SAIAB 209558a, female 32 mm ML. Scale bar 1 mm

Upper beak (Figs 58–59): rostrum blunt, relatively short, not hooked, length equal to width, rostrum angle well defined; hood long, distal tip far from crest, jaw edge straight, jaw angle $<90^\circ$; lateral wall strongly curved. Almost all beak dark except distal lateral wall.

Lower beak (Figs 60–61): rostrum short, blunt, lacking distinct rostrum angle; hood low on crest, slightly curved; crest slightly curved, not indented, not parallel to lower edge of the lateral wall (proximally further apart than distally); lateral wall with curved and angled posterior margin, with fold developed well on upper part of lateral wall. All beak dark except wings and lower and distal part of lateral wall.



Figs 58–61. *Sepia roeleveldi* sp. nov.: 58–59 – upper beak (58 – lateral view, 59 – oblique view), 60–61 – lower beak (60 – lateral view, 61 – top view), SAIAB 209559a, female 32 mm ML. Scale bars 2 mm (58, 60–61) and 1 mm (59)

Radula homodont, with seven teeth per row (Fig. 62). No marginal plates detected. Rachidian teeth low, broad, triangular, fairly symmetrical. First and second laterals similar, simple, symmetrical. Heels small, compact. Marginal teeth not uniform: most of them sharp but some are blunt, moderately curved, not indented.

Spermatophores (Fig. 50) not species-distinct, but they are illustrated to aid possible future studies.

Locking cartilages: funnel component bean-shaped (Fig. 63), internal margins curved, groove



Fig. 62. Radula of *Sepia roeleveldi* sp. nov., SAIAB 209559a, female 32 mm ML. Scale bar 0.5 mm

rather deep, without additional median cleft; mantle component simple, but prominent (Fig. 64).

Funnel with valve (Fig. 65). Distinct vertical ribs under the valve and on the sides (Fig. 65). Funnel organ with dorsal component well defined, bearing anterior ridge and papilla, limbs short: ventral component well defined, oval, compact (Fig. 66).

Cuttlebone much reduced: only thinly calcified dorsal shield remains with extremely convex layers of deposition and growth. Anterior is tapering but rounded, whole appearance oval and broad. There is no spine. Inner cone completely fused with outer cone. Outer cone very broad, thin, with small posterior wings and shallow pocket (Figs 67–71). Mid-dorsally, there is indistinct ridge. Small posterior wings present (Fig. 70).



Fig. 63. Funnel component of funnel-mantle locking apparatus of *Sepia roeleveldi* sp. nov. SAIAB 209553, female 30 mm ML. Scale bar 2 mm

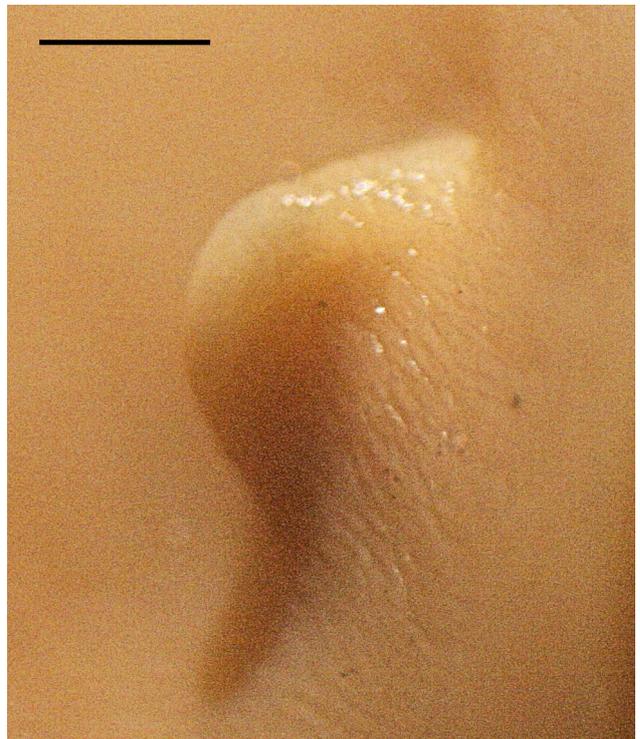


Fig. 64. Mantle component of funnel-mantle locking apparatus of *Sepia roeleveldi* sp. nov. SAIAB 209553, female 30 mm ML. Scale bar 1 mm

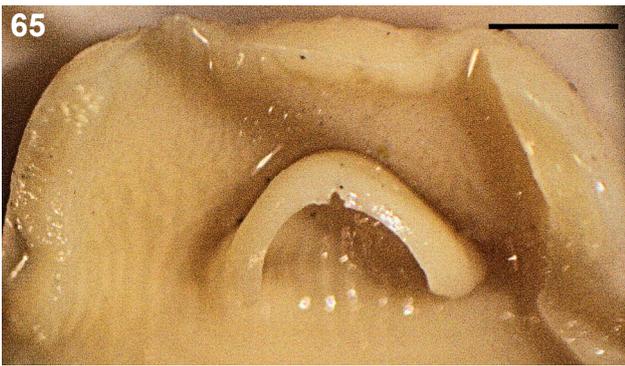


Fig. 65. Funnel valve of *Sepia roeleveldi* sp. nov., SAIAB 209553, female 30 mm ML. Scale bar 1 mm

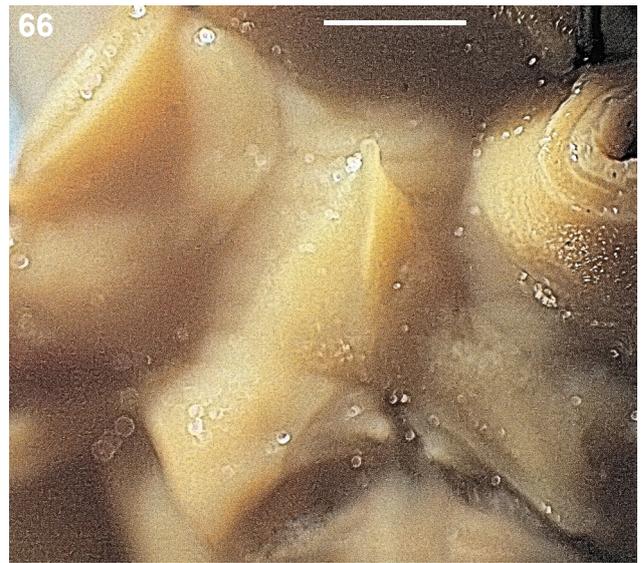
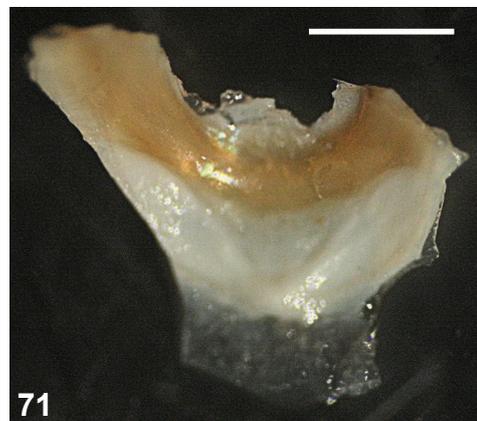
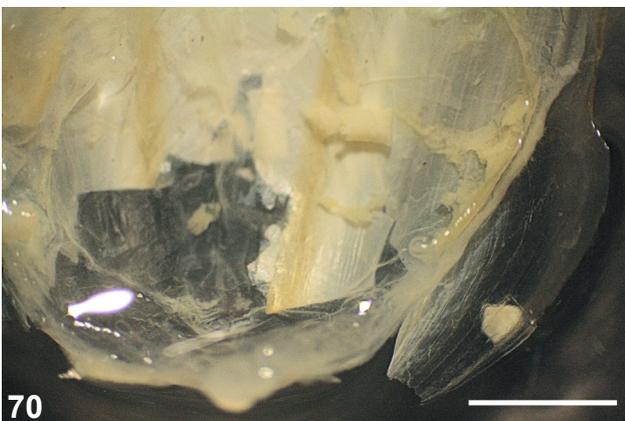


Fig. 66. Both components of a funnel organ of *Sepia roeleveldi* sp. nov., SAIAB 209553, female 30 mm ML. Scale bar 3.5 mm



Figs 67–71. Cuttlebone of *Sepia roeleveldi* sp. nov. (distant anterior and posterior parts damaged): 67 – SAIAB 209552, female 29 mm ML, dorsal view; 68–71 – SAMC S2800, female 32 mm ML: 68 – dorsal view, 69 – ventral view, 70 – magnification of posterior part of inner cone fused with outer cone, small wing visible on the right, 71 – tip of the inner cone. Scale bars 10 mm (67–69), 2.5 mm (70) and 1 mm (71)



Fig. 72. Attachment of spermatophores on the body of *Sepia roeleveldi* sp. nov., anterior mantle margin of the male, SAIAB209558b, male 25 mm ML. Scale bar 10 mm

Remarks. During the systematic workshop, held in Cape Town in 1997 during CIAC97 Symposium, Dr Dimitri N. Khromov indicated that S2800 (tentatively identified by Martina Roeleveld in collection as *S. faurei*) may be in fact a new species (on label: “*Sepia* SAM S2800; (*Hemisepius*?); sp. nov (?); S female; Khromov D.; 11/09/1997”). However, in the unpublished report from the workshop, D. N. Khromov stated: “Other male (obviously a mistake; MRL) specimen SAM 2800 also identified by M. Roeleveld

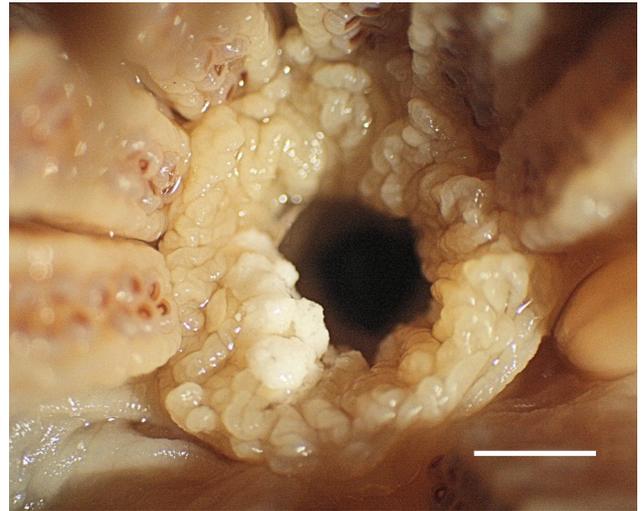


Fig. 73. Buccal membrane of the female of *Sepia roeleveldi* sp. nov., SAIAB 209550, female ML 33 mm. Scale bar 2 mm

as *S. faurei* doubtedly can be *S. faurei* and differs from the described typical female specimen in many features of soft body. Sepion of this specimen is in very poor condition.” This specimen is now a paratype of *S. roeleveldi* sp. nov.

S. roeleveldi sp. nov. is distinguished from all other small sepiids by the flat, very dense warts all over the dorsal body and the two high tubercles on the dorsal head (also covered by these warts).

Mature male (ML 25 mm, SAIAB209558b) shows peculiar sac-like structure storing spermatophores inside, which is anchored on the left anterior part of the nuchal cartilage and well visible between head and mantle (Fig. 72).

Spermatophores are stored on a buccal membrane in fertilized female (Fig. 73).

Distribution. Currently known from the large area of South African seas, from Port Nolloth on the west coast, to Port Alfred on the south coast (Fig. 1). Depth range is wide: 181–497 m, average depth (arithmetic mean) 312 m. Therefore, it is a deep shelf and slope bottom-dwelling species.

Etymology. This species is named to honour Ms Martina Adriana Compagno Roeleveld (see ALLCOCK et al. 2015), sepiid specialist, cephalopod biologist, friend of many years, and discoverer in her collection at SAMS (together with D. N. Khromov) of the species named now after her.

Table 3. Measurements (mm), weight (g) and counts recorded for characters of the holotype and seven other individuals of *S. roeleveldi* sp. nov.

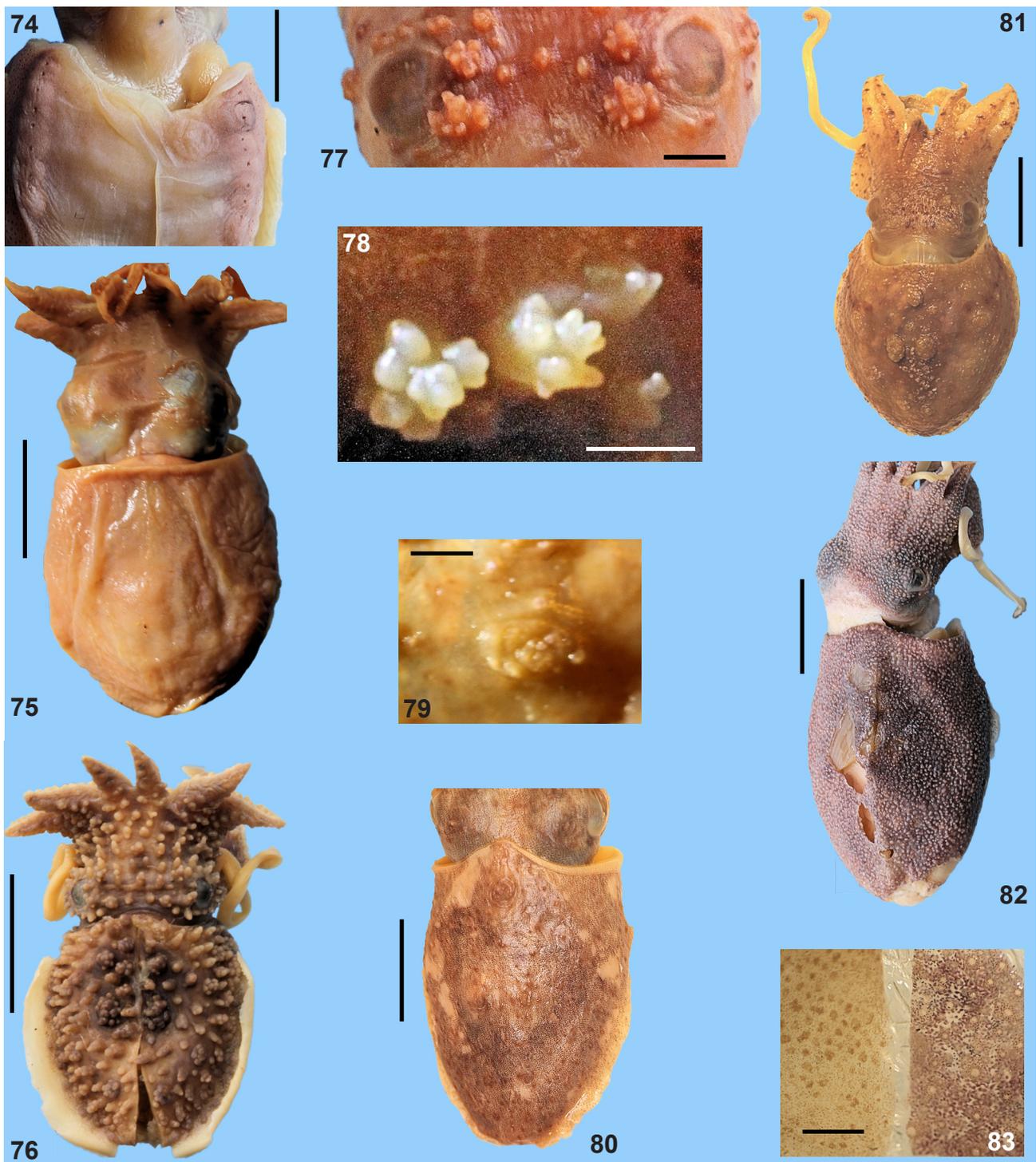
| Catalogue number | SAIAB 209547 Holotype | NHMUK 20200245 | SAIAB 209554a | SAIAB 209556 | SAIAB 209553 | SAIAB 209554b | SAIAB 209548 | SAIAB 209551 |
|------------------|--------------------------|----------------|---------------|--------------|--------------|---------------|--------------|--------------|
| Sex | M | F | M | M | F | M | F | F |
| Maturity | V | * | * | * | V | * | * | * |
| Weight | 6.35 | 7.27 | 5.12 | 3.24 | 7.27 | 5.74 | 4.64 | 12.33 |
| ML | 26 | 30 | 28 | 23 | 30 | 28 | 25 | 33 |
| MLv | 24 | 28 | 25 | 20 | 28 | 26 | 21 | 33 |
| L | * | * | * | * | * | * | * | * |
| LW | * | * | * | * | * | * | * | * |
| HL | 17 | 15 | 18 | 14 | 16 | 15 | 16 | 18 |
| HW | 16 | 15 | 16 | 12 | 15 | 16 | 13 | 17 |
| AMH | 0 | 1 | 3 | 2.5 | 3 | 2 | 1 | 0 |
| FL | 24 | 26 | 26 | 21 | 30 | 27 | 23 | 35 |
| FW | 3 | 2 | 3 | *2 | 4 | 2 | 2 | 4 |
| F _{1a} | 3.5 | 4.5 | 4 | 3.5 | 4 | 5 | 4.5 | 5.5 |
| F _{1p} | 1 | 1.5 | 1 | 0.5 | 1.5 | 1.5 | 1.5 | 3.5 |
| FF _u | 5 | 6 | 7 | 5.0 | 6 | 7 | 6.5 | 9 |
| FuL | 11 | * | * | * | 15 | * | * | * |
| AL1-rt | 12 | 12 | 14 | * | 12 | 11 | *12 | 15 |
| AL2-rt | 14 | 13 | 15 | * | 14 | 13 | *12 | 17 |
| AL3-rt | 13 | 13 | 15 | * | 13 | 13 | *12 | 17 |
| AL4-rt | 16 | 15 | 18 | 14 | 16 | 16 | 15 | * |
| HcL | 14 | — | 17 | 14 | — | 18 | — | — |
| MHL | 10 | — | 8 | 9 | — | 9 | — | — |
| TIP1AL | 1.5 | 1 | 1.2 | * | 2(0.5) | * | 2(0.5) | 2.5 |
| TL | 55 | 49 | 49 | * | 59 | 48 | 53 | 70 |
| Tcl | 5 | 6 | 6 | * | 5.5 | 4.5 | 4.5 | 6.5 |
| AS1-rt | 0.7 | 0.55 | 0.75 | 0.55 | * | 0.55 | 0.5 | 0.7 |
| AS2-rt | 0.75 | 0.6 | 0.8 | 0.6 | * | 0.75 | 0.55 | 0.75 |
| AS3-rt | 0.75 | 0.6 | 0.85 | 0.6 | * | 0.85 | 0.5 | 0.7 |
| AS4-rt | 1 | 0.6 | 1 | 0.75 | * | 0.9 | 0.6 | 0.65 |
| AS14 | 0.65 | — | 0.7 | 0.5 | — | 0.6 | — | — |
| AS14m | 0.2 | — | 0.3 | 0.3 | — | 0.25 | — | — |
| CIS | 0.35 | 0.35 | 0.35 | * | 0.3 | 0.35 | 0.3 | 0.45 |
| ASC1-rt | 25 | *38 | 28 | * | * | * | 28 | 34 |
| ASC2-rt | 31 | *64 | 32 | * | * | * | 58 | 60 |
| ASC3-rt | 35 | *62 | 31 | * | * | *35 | 62 | 64 |
| ASC4-rt | 33 | *50 | 33 | 31 | * | 40 | 49 | * |
| CS# | 44 | 64 | 61 | * | 66 | 62 | 65 | 66 |
| CTR# | 13 | 17 | 17 | * | 15 | 14 | 14 | 14 |
| CES | 26 | 35 | 34 | * | 31 | 30 | 33 | 35 |
| CIRC | 4 | 4 | 4 | * | 4 | 5 | 4 | 5 |
| LORC | 14 | 17 | 18 | * | 16 | 15 | 14 | 15 |

— – not applicable

* – not possible to measure/estimate

*number – approximate

in parentheses – other arm measurement



- Fig. 74. Pores on the anterior ventral part of the mantle of *Sepia typica* (SAIAB, not catalogued), female 20 mm ML. Scale bar 10 mm
- Fig. 75. Dorsal view of *Sepia robsoni* (SAIAB, not catalogued), male 22 mm ML. Scale bar 10 mm
- Fig. 76. Dorsal view of the holotype of *Sepia pulchra*, SAM S1036, male 17 mm ML. Scale bar 10 mm
- Figs 77–79. Close-up of complicated structures on the head and mantle of *Sepia barosei* sp. nov.: 77 – turrets near the eyes, SAIAB 209544, male 17 mm ML, holotype; 78 – turrets near the eyes, SAIAB 209546, female 21 mm ML; 79 – median patch on the dorsal mantle, SAIAB 209546, female 21 mm ML. Scale bars 10 mm (77) and 1 mm (78–79)
- Figs 80. Dorsal mantle of *Sepia shazae*, SAIAB 205824, holotype, male 30 mm ML. Scale bar 10 mm
- Fig. 81. Dorsal view of *Sepia dubia*, SAIAB 205830, female 22 mm ML. Scale bar 10 mm
- Fig. 82. Skin of *Sepia faurei* on dorsal body, SAMC MB A089325, female 29 mm ML. Scale bar 10 mm
- Fig. 83. Skin of *Sepia roeleveldi* sp. nov. (left), SAIAB 209559a, female 32 mm ML; skin of *Sepia faurei* (right), SAMC MB A089325, female 29 mm ML. Scale bar 1.5 mm

KEY TO SMALL *SEPIA* SPECIES, SEMI-ENDEMIC IN SOUTHERN AFRICAN WATERS

There are now eight such species, and more are expected to be described. They are all mature (both sexes) at ML not larger than 40 mm, and this is considered here as “small *Sepia*”.

1. Pores sub-marginally on antero-ventral mantle (may be dark or light):
 - subgenus *Hemisepius*, one species: *Sepia typica* (likely a complex of species, under revision) (Fig. 74)
- Pores absent 2
2. I pair of arms distally (at their ends) without suckers, finger-like. Whole cuttlebone modified: striae convex, not wavy, inner cone flat, fused completely (may be calcified to a various degree)
 - subgenus *Digitosepia* 3
- Ends of arms normal, with suckers throughout; cuttlebone not modified (may look fragile)
 - subgenus *Sepia* 4
3. Dorsal mantle almost smooth on appearance
 - *S. (D.) robsoni* (Fig. 75)
- Dorsal mantle covered by various skin structures, not smooth. 5
4. Characteristic, densely distributed papillae on dorsal mantle, head and arms I–III. Papillae on arms long, well developed (Fig. 76)
 - *S. (S.) pulchra*
- No such densely placed, characteristic skin structures on the dorsal body. No long, protruding papillae on arms. 6
5. Shiny skin between various protuberances on mantle, which are not dense. Long and complicated turrets on the dorsal head (Figs 77–79)
 - *S. (D.) barosei* sp. nov.
- Skin of dorsal mantle and head densely covered either with tubercles or with flat warts 7
6. Habitus: body elongated, eyes fully lateral. No protruding patches (Fig. 80) on mid-dorsal mantle; cuttlebone elongated, thin and fragile
 - *S. (S.) shazae*
- Habitus: body squat, broad, eyes dorsal. Two prominent protruding patches (Fig. 81) on mid-dorsal mantle; cuttlebone very broad, well calcified, not thin and fragile *S. (S.) dubia*
7. Skin on the dorsal mantle, head and arms I–III densely covered by flat, characteristic warts (Figs 39, 46, 72) *S. (D.) roeleveldi* sp. nov.
- Skin on the dorsal mantle, head and arms covered by fairly dense tubercles (Figs 82–83)
 - *S. (D.) faurei*

DISCUSSION

The small sepiids status and their systematic position (or lack thereof) were discussed at length by LIPINSKI & LESLIE (2018); an interested reader is referred to that paper. However, the two new species described here, re-description of *S. robsoni* (Massy, 1927) and *S. faurei* Roeleveld, 1972 (LIPINSKI in prep.) and re-evaluation of *S. typica* (LIPINSKI & LESLIE, in prep.) offer some leads and suggestions that small sepiids should be given a generic status as a group. This new status should be based upon a thorough study of their cuttlebones which are all different from the other sepiids, accompanied by study upon sucker morphology and their arrangement on all arms. However, there is no material at the moment to conduct such a study. Because of fragility of cuttlebones of small sepiids and imminent damage during any sort of preservation, collection of such material presents serious challenges. It is hoped that after collection of suitable material, the following questions may be addressed:

1. Which structures are present on the dorsal shield of the cuttlebone, on its dorsal and ventral side?
2. What is the hierarchy of calcification of dorsal shield, expressed by various species of small sepiids?

Such structural study should be accompanied by genetic and molecular biology research.

However, without waiting for the outcome, certain groupings can now be defined inside this new hypothetical genus of all small sepiids. These groupings, following a tradition of sub-genera in this group, should include subgenus *Sepia* (*S. dubia*, *S. pulchra* and *S. shazae*), subgenus *Hemisepius* (*S. typica*), and the new subgenus *Digitosepia* (*S. robsoni*, *S. faurei*, *S. roeleveldi* and *S. barosei*). First two subgenera are well defined and described in various papers. *Digitosepia* was already recognized by LU (1998) and listed as his Group 5, which was based on the characteristics provided by ROELEVELD (1972, also group 5, p. 269).

This arrangement is temporary as a sub-generic status reflects rather a lack of more specific evolutionary understanding than anything else. Until thorough morphological and molecular biology study is completed, this temporary status quo has to guide students of Sepiidae. This is because there were many failed attempts to revise sepiids, and to create new genera and subgenera. Ample warning is provided by ADAM & REES (1966) in their monograph.



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