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TWO NEW SPECIES OF THE GENUS *TRACHYCYSTIS* FROM SOUTH AFRICA (MOLLUSCA, GASTROPODA PULMONATA, ENDODONTIDAE)

by

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With 11 text-figures and 2 plates

The genus *Trachycystis* Pilsbry, 1893, is represented by more than a hundred species in southern Africa. It belongs to the family Endodontidae, which is one of the six dominant families of terrestrial molluscs in South Africa (Van Bruggen, 1978). The large number of species as well as the fact that many of them have not been well described, makes this an extremely difficult genus to deal with taxonomically. The matter is complicated further, especially for local workers, because most of the type specimens are dispersed in European museums.

Since 1974 the author has been engaged in a study of the terrestrial molluscs, found at the top end of a narrow cliff, called Landdroskloof, situated on the western slopes of the Hottentots Holland mountains, 34°02' S 18°59' E. The locality falls in the recently proclaimed Hottentots Holland Nature Reserve and is about 60 km east of Cape Town and 1350 m above sea-level. The Jonkersnek rain gauge which is only about 5 km away from this site, is known to have recorded a 15-year (1945-1960) mean annual rainfall of 3539.2 mm. This is the highest measured mean precipitation in South Africa.

Specimens were collected during different seasons of the year. Among the several interesting molluscs species which inhabit this area, two yet undescribed species of the genus *Trachycystis* were found. As the habitat varies considerably in such a mountainous region, it can be expected that stenotopic species would only occur in certain limited microhabitats. The two new species live in places which are sheltered from the sun for at least a few

hours per day. The vegetation in these places consists of a thick growth of Cyperaceae and Restionaceae, among others *Restio perplexum*. These conditions ensure that a high relative humidity prevails in the microhabitat throughout the year. Mosses found in the undergrowth appear to be the main food of these molluscs.

Both the above-mentioned new species appear to belong to the subgenus *Trachycystis* s.s. according to the system followed by Watson (1934) and Connolly (1939). The type locality also falls well within the distributional range of the subgenus. Only two characters shared by both, do not conform to the definition of Watson (1934) and Connolly (1939) for this subgenus. The dorsal keel on the hinder part of the foot does not bear the serrations which they described as typical of the subgenus. Secondly, they stated that the protoconch bears spiral striolae while it is smooth in these two species. In my opinion, these two characters alone are not of such significance that they should exclude a species from the subgenus.

***Trachycystis (Trachycystis) leucocarina* spec. nov.** (figs. 1-8, pls. 1, 2)

Shell (pl. 1, above) thin, imperforate, corneous, dark brown or yellow brown, transparent, glossy and smooth in the hand. Spire depressed but each whorl rising slightly above the following one, thus not discoid. Whorls slightly compressed but gaining rather rapidly in height. Suture deeply channelled with the result that the whorls are narrowly shouldered dorsally, the shoulder constituting the outer edge of the sutural channel. Base of shell rounded. Peristome simple, acute. Labrum nearly straight and vertical in profile. Columella white, thickened but not reflexed, slightly inclined to the left side. Apex of shell obtuse. Shell sculpture easily discerned at 6x magnification. First $1\frac{1}{2}$ whorl with very weak growth wrinkles. Close, straight, transverse striae, arranged at almost right angles to the suture, covering the remaining whorls; these striae crossed by equally spaced spiral lines. Spirals of the same strength as the transverse striae, except for the dorsal group of about 18 spirals which cover that part of each whorl just radially of the suture; these few dorsal spirals almost twice as strong as those lower down on each whorl.

The absence of transverse costae on the shell of *T. leucocarina* clearly distinguishes this species from *T. bisculpta* (Benson, 1851), *T. rubra* Connolly, 1925, *T. jucunda* Connolly, 1929, and *T. proxima* Connolly, 1939. Although *T. tollini* (Benson, 1856) also has no transverse costae, the shell of *T. leucocarina* differs clearly from it by having a deep channelled suture.

Foot long, narrow, may reach a length of more than 35 mm when animal

stretches (field notes). Hinder part carries an unpigmented keel, which is not serrated. I base the name of the species on this white keel. It extends from just posterior to the shell's circumference, in the extended animal, to the posterior tip of the foot. No caudal mucous pore. Foot fringe relatively wide, crossed by vertical grooves but no prominent median groove posteriorly. Sole of foot undivided. Suprapedal groove present. The lateral areas of the foot sole can be folded towards each other ventrally so that a central groove is formed. In the field I noticed that this enables the sole to embrace the thin round stems of the plants on which it lives, so that the animal can proceed effectively along them.

Measurements in mm of shells:

Specimen	Whorls	Max. diam.	Min. diam.	Height	Aperture alt. × lat.
Holotype	4½	11.83	9.64	9.14	6,8 × 6,0
Paratype 1	4	9.64	8.61	7.71	
" 2	4	10.29	8.70	7.73	
" 3	4½	11.33	9.90	8.33	
" 4	4½	11.84	10.45	9.03	
" 5	4¾	10.52	9.09	7.73	
" 6	3¾	8.87	8.04	7.14	
" 7	4	9.54	8.38	7.35	
" 8	4	10.09	8.90	7.97	
" 9	4	9.93	8.59	6.94	
" 10	4	9.64	8.43	7.52	

Extended upper tentacles 6 mm long, tentacular bulbs elongated curved, apical half of each tentacle unpigmented except for the black eye. According to Watson (1934) similar tentacles have only been found in the two subgenera *Trachycystis* s.s. and *Cyclocystis* Watson, 1934. The white keel and upper tentacle apices contrast sharply with the rest of the headfoot, which is intense black (pl. 2, above).

Mantle ridge expanded backwards on both sides of the body, fused behind the connection of the visceral mass and foot to form a small round lobe with a concave upper surface. In the extended animal the base of the shell is carried on this structure. Anatomical relationships of the pallial organs (fig. 1) conform to those described for *T. biscalpta* by Watson (1934).

Retractor muscles from the various organs join to constitute a well-developed columellar muscle. The penis retractor, however, has an independent origin on the pallial floor.

Cerebral ganglia well-separated by a relatively long connective. Cerebropleural and pleuropedal connectives of the right side shorter than the left ones. This together with the fact that the two parietal ganglia differ in shape,

makes the nerve ring an asymmetrical structure (fig. 2). Salivary glands small, paired, lobulated and attached dorsally to the alimentary canal a little distance behind the pharyngeal bulb. Their efferent ducts pass through the nerve ring to open into the pharynx.

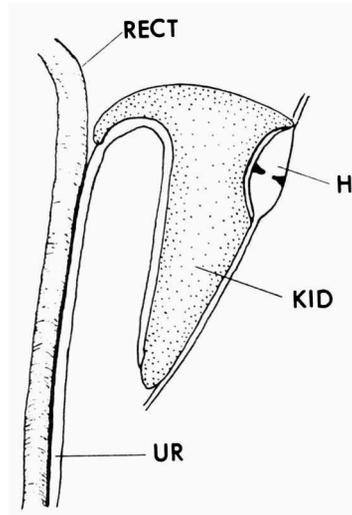


Fig. 1. *Trachycystis leucocarina* spec. nov., pallial organs (not drawn to scale), H = heart, KID = kidney, RECT = rectum, UR = ureter.

Jaw thin, vertically folded, corresponds with that described by Watson (1934) as usual for the genus. Radular formula (fig. 3) 38:15:C:15:38. Central tooth slightly smaller than admedians, tricuspid with a long mesocone and short ectocones. The anterior part of the base of the mesocone is so narrow that it can only be seen as a sharp tapering ridge, stretching anteriorly to a point near the basal parts of the ectocones, without fusing with them. Admedians almost symmetrical as a result of the endo- and ectocones being more or less equally developed. Their mesocones arise from the basal plate posteriorly and separately from the endo- and ectocones (fig. 3). In this aspect the new species resembles *T. tollini* and *T. proxima* (*T. approximans* Connolly, 1931, nec Preston, 1911, in Watson, 1934) and differs from *T. bisculpta* and *T. jucunda* as described by Watson (1934). In the outer laterals, however, the three cusps are basally confluent.

A gradual transition takes place from the laterals to the marginals. Marginals all tricuspid with cusps basally fused. This differs from the condition in *T. tollini* and *T. proxima* (see Watson, 1934) where an ectocone is absent

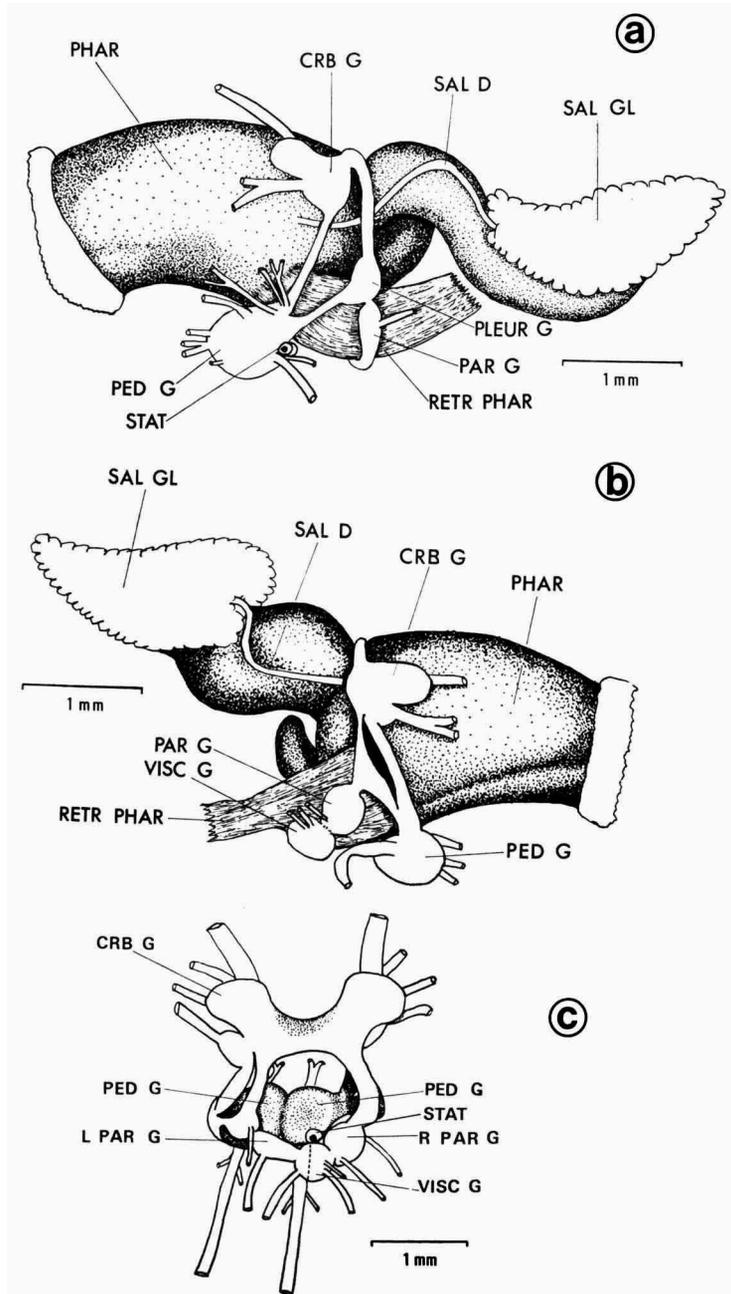


Fig. 2. *Trachycystis leucocarina* spec. nov., (a) pharyngeal complex from the left side; (b) do., from the right side; (c) central nervous system from the posterior side. CRB G = cerebral ganglion, L PAR G = left parietal ganglion, PAR G = parietal ganglion, PED G = pedal ganglion, PHAR = pharynx, PLEUR G = pleural ganglion, RETR PHAR = retractor muscle of pharynx, R PAR G = right parietal ganglion, SAL D = salivary duct, SAL GL = salivary gland, STAT = statocyst, VISC G = visceral ganglion.

from the inner marginals. The ectocones of *T. leucocarina*, however, are much smaller than the long meso- and endocones. Endocones of inner marginals somewhat shorter and narrower than the mesocones and with an arched profile (fig. 3). While the marginals diminish in size laterally, their ectocones become relatively longer, reaching about the same length as the endocones on the outer marginals. Basal plates at centre of radula long, becoming shorter laterally.

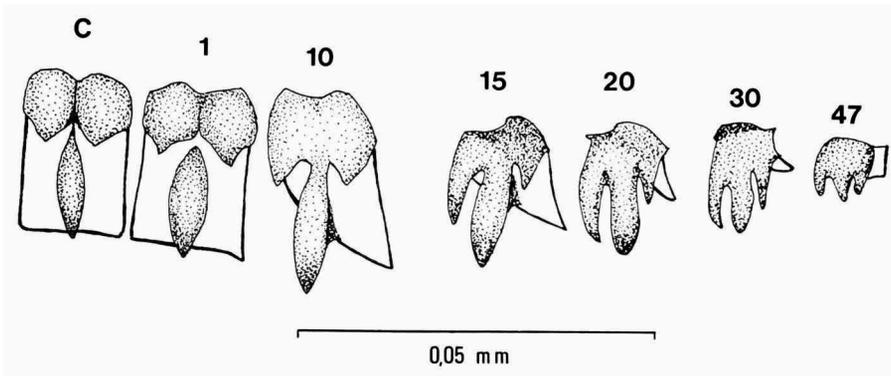


Fig. 3. *Trachycystis leucocarina* spec. nov., teeth of radula, C = central tooth.

Genitalia (fig. 4). Ovitestis consists of lobulated acini covered by a pigmented membrane and fully occupies the first $1\frac{1}{2}$ whorls of the shell. Hermaphrodite duct leads to the albumen gland which is followed by a relatively short, thick spermoviduct. Distally it divides into the vas deferens and free oviduct. As typical for the subgenus the free oviduct is very slender. It is joined by the long and equally slender duct of the spermatheca which has the same diameter throughout its length. Distal to the confluence of these two ducts the female part of the system is continued as a short, slender vagina which opens into the short genital atrium. This opens to the exterior by means of the genital pore, situated ventral to the base of the right upper tentacle.

The vas deferens proceeds distally with the oviduct and vagina as far as the atrium, to which it is attached. It then turns backwards and is continued over the length of the penis to open into its apical end. Just prior to its fusion with the penis, the vas deferens abruptly widens to form a short, globular epiphallus which is connected to the penis by means of a short, more slender, distal part. This type of epiphallus, together with the position of its opening on the apex of the penis, is typical for the subgenus. Diameter of vas deferens over its entire length is greater than that of the free oviduct or the

duct of the spermatheca. Penis a slightly curved organ with a diameter many times that of the free oviduct and spermathecal duct, opens into the genital atrium next to the vagina. Insertion of penial retractor muscle extends from just distal to the connecting point of the epiphallus, a short distance down the convex side of the penis.

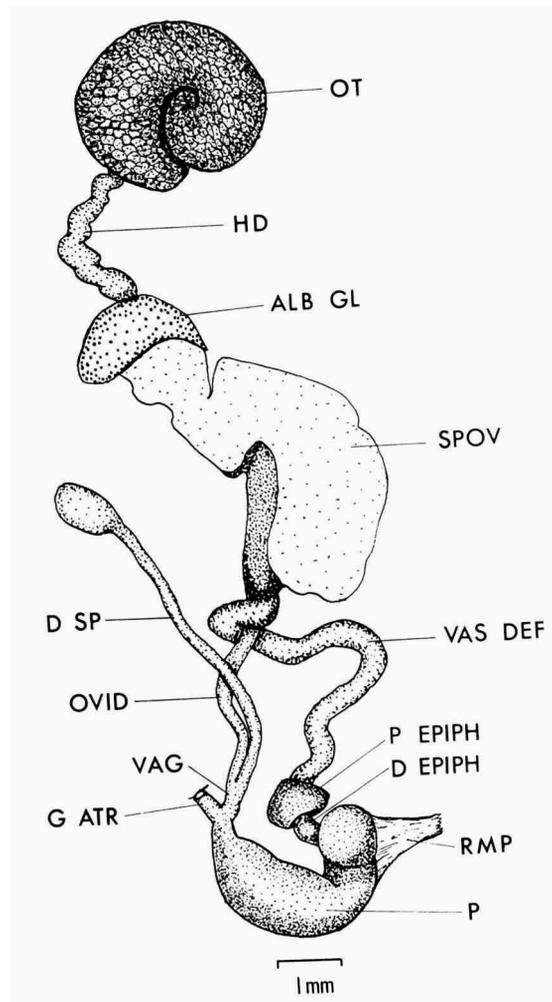
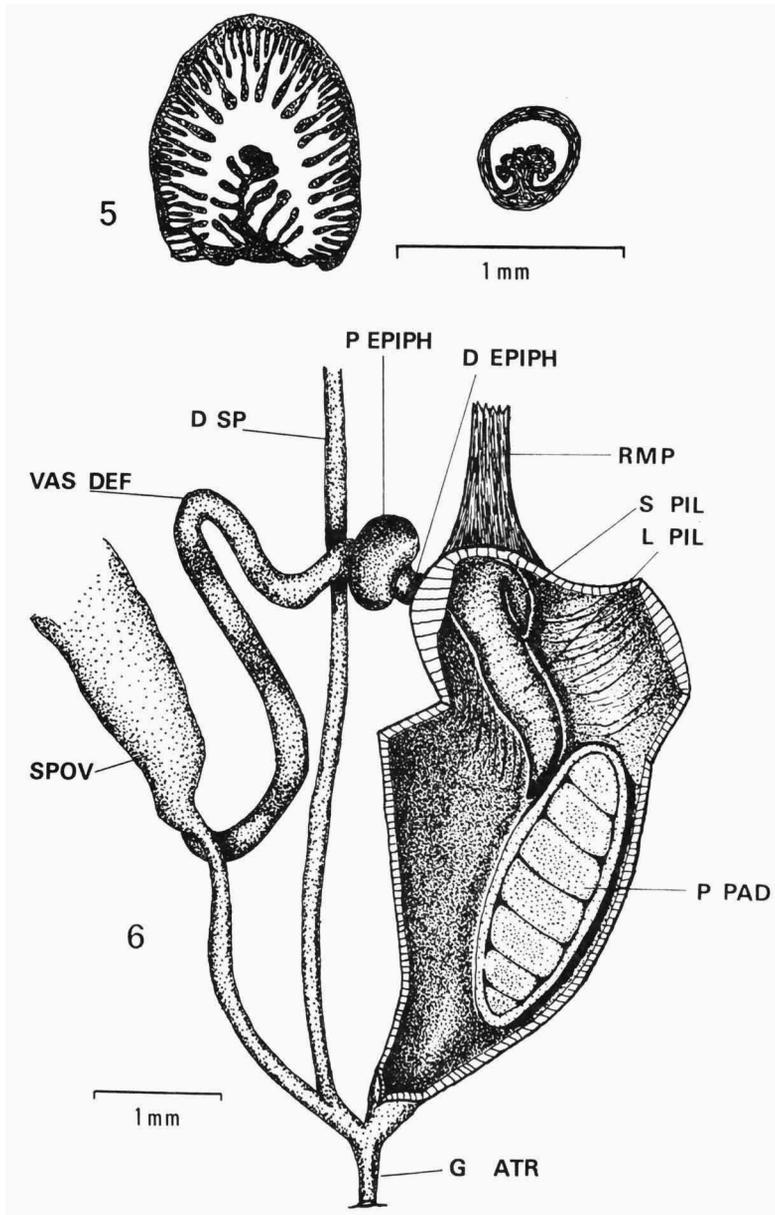


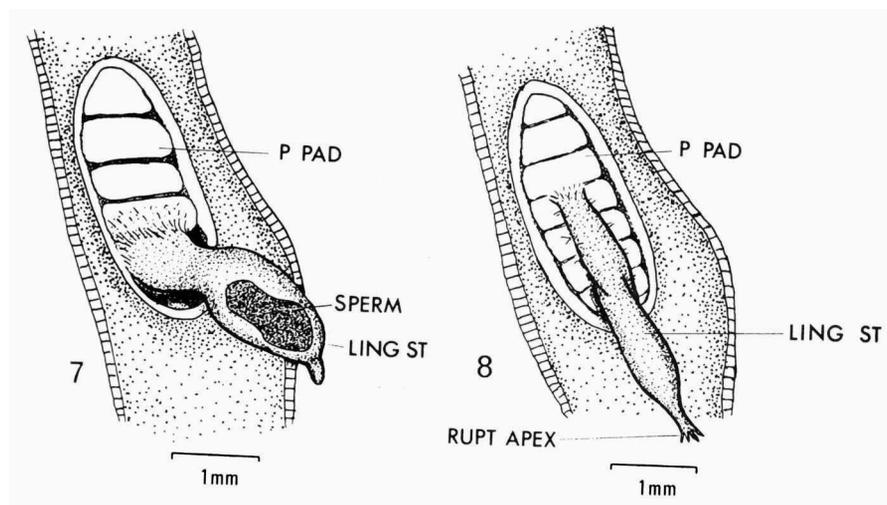
Fig. 4. *Trachycystis leucocarina* spec. nov., genitalia. ALB GL = albumen gland, D EIPH = distal part of epiphallus, D SP = duct of spermatheca, G ATR = genital atrium, HD = hermaphrodite duct, OT = ovotestis, OVID = oviduct, P = penis, EIPH = proximal globular part of epiphallus, RMP = retractor muscle of penis, SPOV = spermooviduct, VAG = vagina, VAS DEF = vas deferens.



Figs. 5-6. *Trachycystis leucocarina* spec. nov. 5, Transverse sections through proximal globular and more slender distal part of epiphallus. 6, Distal part of genitalia with penis opened, D EPIPH = distal part of epiphallus, D SP = duct of spermatheca, G ATR = genital atrium, L PIL = long penial pilaster, P EPIPH = proximal globular part of epiphallus, P PAD = penial pad, RMP = retractor muscle of penis, S PIL = short penial pilaster, SPOV = spermoviduct, VAS DEF = vas deferens.

The only description, so far, which gives an indication of the internal morphology of the epiphallus and penis of *Trachycystis* is that of *T. sylvicola* (Van Bruggen & Verdcourt, 1965). The inner surface of the wall of the epiphallus in *T. leucocarina* carries a number of obliquely arranged transverse lamellae. A ridge traverses the length of the lumen in the swollen part of the epiphallus. This ridge is connected to the wall of the epiphallus and the lamellae are extended onto it (fig. 5). In the more distal, slender portion of the epiphallus the lamellae are absent and the ridge is broadly connected to the wall. At the opening of the epiphallus into the penial lumen, the ridge turns sharply and is continued distally as a short penial pilaster (fig. 6). A second much longer penial pilaster originates from that area of the penial wall from which the penial retractor muscle originates exteriorly. This longer pilaster stretches distally through about half the length of the penis and it is connected to the wall over its whole length (fig. 6). The arrangement of these two pilasters is such that the opening of the epiphallus into the penis is situated in a deep groove between their basal parts (fig. 6).

A conspicuous oval body, extending over the middle portion of the penis, bulges into its lumen from that part of the wall constituting the convex surface of the penis. The proximal part of this pad-like body (penial pad), overlaps with the distal part of the long pilaster (fig. 6). The overlapping sections lie close to each other. The slightly concave surface of the penial pad is divided into more or less seven oval areas by shallow transverse grooves.



Figs. 7-8. *Trachycystis leucocarina* spec. nov. 7, Penial pad with linguiform structure containing sperm mass, LING ST = linguiform structure, P PAD = penial pad, SPERM = sperm mass. 8, Penial pad with linguiform structure not containing sperm mass, RUPT APEX = ruptured apex.

These areas are surrounded by a narrow ridge. In cross-section the pad was found to consist of connective tissue, heavily interspersed with muscle fibres.

In two of the penes dissected a linguiform structure, with a mamillate apex, was found attached to the penial pad. In these two specimens it extended distally and contained a pink coloured body in its basal part (fig. 7). This linguiform structure was often found in other specimens as well but did not contain the pink body and was more slender while its apex was ruptured (fig. 8). In these cases, however, the genital system contained a body, similar to the pink one found in the linguiform structure of the previously mentioned two specimens, in the spermatheca. On closer examination the pink bodies from both organs were found to consist of a thin non-cellular membrane enclosing a mass of sperm. In serial sections the linguiform body was also found to have a non-cellular wall and thus proves to be a secreted structure which is attached to the penial pad. The origin of the secretion was not traced.

It is suggested that the linguiform structure is a transformed spermatophore. Instead of being transferred from the penis to the spermatheca of the copulating partner in the normal pulmonate fashion, its tip apparently ruptures and it serves as an intromittent organ which remains attached to the penial pad while only the sperm mass, enclosed by a thin membrane, is transferred to the copulating partner. Normal copulation seems to be unlikely as the diameter of the penis exceeds that of the female ducts many times and an arrangement such as described above seems to be the most likely manner in which sperm can be effectively transferred.

Holotype: South Africa, Cape Province, Hottentots Holland Nature Reserve, Landdroskloof, 34°02' S 18°59' E, altitude 1350 m, 12 April 1979, leg. W. F. Sirgel (Natal Museum, specimen no. B1152, holotype no. T2300. Paratypes: same data (paratypes nos. 1, 2, 3, 4, 5); *ibidem*, 13 December 1978, leg. W. F. Sirgel (paratypes nos. 6, 7, 8, 9, 10). Apart from the numbered paratypes there are 12 unnumbered paratypes from the same locality. All the above material is preserved in 70% alcohol. This material has been divided among the following institutions: British Museum (Natural History), London — paratypes nos. 1, 6 and two unnumbered paratypes; Rijksmuseum van Natuurlijke Historie, Leiden — paratypes nos. 3, 8 and two unnumbered paratypes; Musée Royal de l'Afrique Centrale, Tervuren, Belgium — paratypes nos. 2, 7 and two unnumbered paratypes; South African Museum, Cape Town — paratypes nos. 5, 10 and two unnumbered paratypes; Natal Museum, Pietermaritzburg, South Africa — paratypes nos. 4, 9 and all the remaining paratypes. Dry shells will be sent to each of the five above-mentioned institutions.

Trachycystis (Trachycystis) contrasta spec. nov. (figs. 9-11, pls. 1, 2)

Shell (pl. 1, below) thin, imperforate, corneous, dark brown to reddish brown, transparent glossy and smooth in the hand. Spire depressed globose, little exerted, apex obtuse, whorls $4\frac{1}{2}$, regularly increasing, rounded at the

periphery. Suture simple, shallow. Aperture $\frac{3}{4}$ lunate, peristome simple, acute, labrum straight, receding little in profile, columella glossy white, thickened, not reflexed but inclined to the left. First $1\frac{1}{2}$ whorls smooth, next $\frac{1}{2}$ with weak growth wrinkles. Remaining whorls covered by close, straight transverse striae arranged slightly obliquely to the suture and crossed by spiral lines extending over the entire surface of these whorls. The dorsal 12 spiral lines, just below the suture, can be clearly discerned at 6x magnification. They are spaced about twice as far apart as the weaker transverse striae. Lower down, towards the periphery of each whorl the spirals become closer and weaker so that the transverse sculpture is stronger than the spirals at the periphery of the whorl. Basal sculpture similar to peripheral, becoming stronger towards the columella while the spirals become slightly undulating.

Measurements in mm of shells:

Specimen	Whorls	Max. diam.	Min. diam.	Height	Aperture alt. \times lat.
Holotype	4	10.7	9.68	7.46	
Paratype No. 1	4	10.1	8.88	6.79	
" " 2	$3\frac{3}{4}$	9.2	8.00	6.15	
" " 3	$3\frac{3}{4}$	9.44	8.18	6.29	
" " 4	$3\frac{3}{4}$	6.60	5.40	4.43	
" " 5	$3\frac{1}{2}$	8.05	7.10	5.29	
" " 6	$3\frac{3}{4}$	8.44	7.64	5.59	
Largest dry shell in my collection	$4\frac{1}{2}$	12.11	10.64	7.91	6.30 \times 6.64

Foot and head very closely resemble that of *T. leucocarina* in being long and narrow, foot reaches a length of at least 38 mm in the stretched living animal (pl. 2, below), hinder part of foot carrying an unserrated, unpigmented keel extending from the periphery of the shell to the posterior tip of the foot in the extended animal (pl. 2, below). No caudal mucous gland, sole of foot undivided, foot fringe relatively wide but not crossed by a postero-median groove, supra-pedal groove present above peripodial groove. The lateral areas of the sole of the foot can be folded towards each other enabling the sole to embrace the thin round stems of the plants on which the animal lives.

Extended upper tentacles 8 mm long, tentacular bulbs elongated curved, while the apical 3 mm of the tentacles are unpigmented except for the black eyes. The upper tentacles thus resemble those described by Watson (1934) for *T. biscalpta* and *T. tollini* as well as those of *T. leucocarina*. In all the specimens of *T. biscalpta* and *T. tollini* examined by me the apical part of the upper tentacles, however, contains some black pigmentation with the

result that it has a dirty white colour and the transition between the black and white portions of the tentacle is not sharp. In *T. leucocarina* the apical portion is pure white but even here no sharp line of demarcation between the two portions exists. In *T. contrasta*, however, the apical portion is totally devoid of pigmentation and there is a sharp line of demarcation between the basal black, and apical white parts of the upper tentacles (pl. 2, below). This feature results in a drastic colour contrast between the white portion of the tentacles and the keel on the one hand and the intense black colour of the rest of the head and foot. I base the species name on these sharp contrasts in the coloration of the animal.

The mantle ridge is expanded posteriorly to form a small round lobe on which the base of the shell rests in the expanded animal. The anatomical relationships of the pallial organs corresponds to those of *T. bisculpta* and *T. leucocarina* (fig. 1).

The penial retractor muscle has an independent origin on the pallial floor whilst the retractor muscles of the other organs fuse into a well-developed columellar muscle. The right upper tentacle retractor muscle passes between the penis and vagina. The central nervous system and salivary glands correspond to those of *T. leucocarina* (fig. 2) while the vertically folded jaw is similar to that described by Watson (1934) as usual for the genus.

Radular formula 41:15:C:15:42 × 183. All teeth are tricuspid (fig. 9). Central tooth with long mesocone and short ectocones, slightly smaller than admedians, the long anterior basal part of the mesocone slightly wider than that of *T. leucocarina* and confluent with the basal parts of the ectocones. Admedians more or less symmetrical, but with mesocone much longer than the endo- and ectocone; a very narrow tapering ridge stretching anteriorly from the base of the mesocone to a point where the bases of the endo- and ectocone meet. This connecting basal ridge of the mesocones widens gradually in the teeth lateral to the admedians so that the three cusps have a common

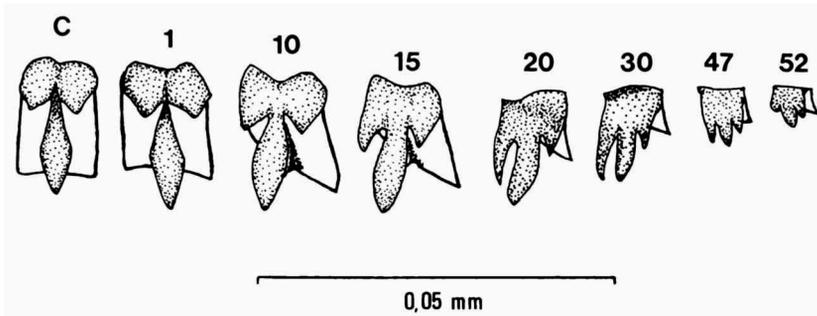


Fig. 9. *Trachycystis contrasta* spec. nov., teeth of radula, C = central tooth.

base in the outer laterals and marginals. A gradual transition takes place from the laterals to the marginals during which the endocones become much longer reaching almost the same length as the mesocones at marginal no. 15. The ectocones, which are much shorter than the other cusps in the laterals and inner marginals, gain in relative length in the outer marginals reaching about the same length as the endocones. The basal plates of the teeth shorten gradually from the centre of the radula towards its lateral margins.

Genitalia (fig. 10). Ototestis covered by a pigmented membrane fully occupies the first $1\frac{1}{2}$ to 2 whorls of the shell, followed distally by the hermaphrodite duct, albumen gland, spermiduct and very slender oviduct which is separated from the relatively thick vas deferens. The long slender duct of the spermatheca joins the free oviduct without widening near the

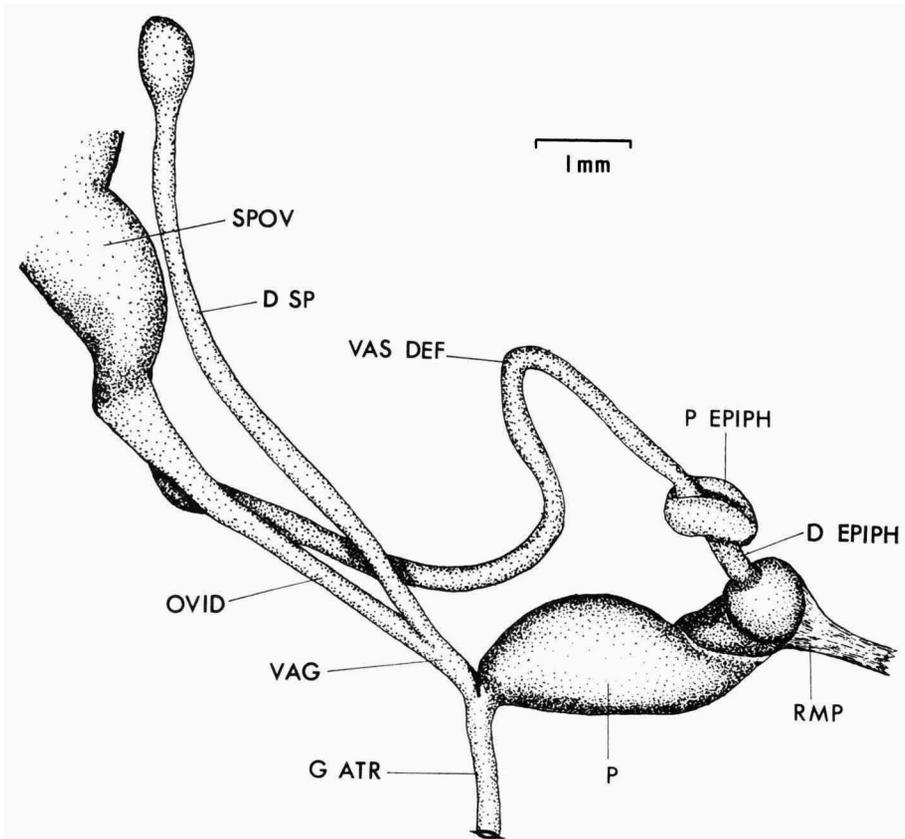


Fig. 10. *Trachycystis contrasta* spec. nov., distal part of genitalia, D EPIPH = distal part of epiphallus, D SP = duct of spermatheca, G ATR = genital atrium, OVID = oviduct, P = penis, P EPIPH = proximal globular part of epiphallus, RMP = retractor muscle of penis, SPOV = spermooviduct, VAG = vagina, VAS DEF = vas deferens.

point of confluence. Distal to this point a short vagina, which opens into the genital atrium, is present. The vas deferens describes the normal loop on its way to the apex of the penis. It abruptly widens a short distance proximal to the connection with the penis to form the globular epiphallus which is typical of the subgenus. The slightly curved penis with a much greater diameter than that of the free oviduct, duct of the spermatheca or vagina, joins the genital atrium next to the vagina. The genital atrium is a slender duct embedded in the tissues of the body wall and opening to the exterior through the genital pore which is situated ventral to the base of the right upper tentacle. The insertion of the penial retractor muscle is just distal to

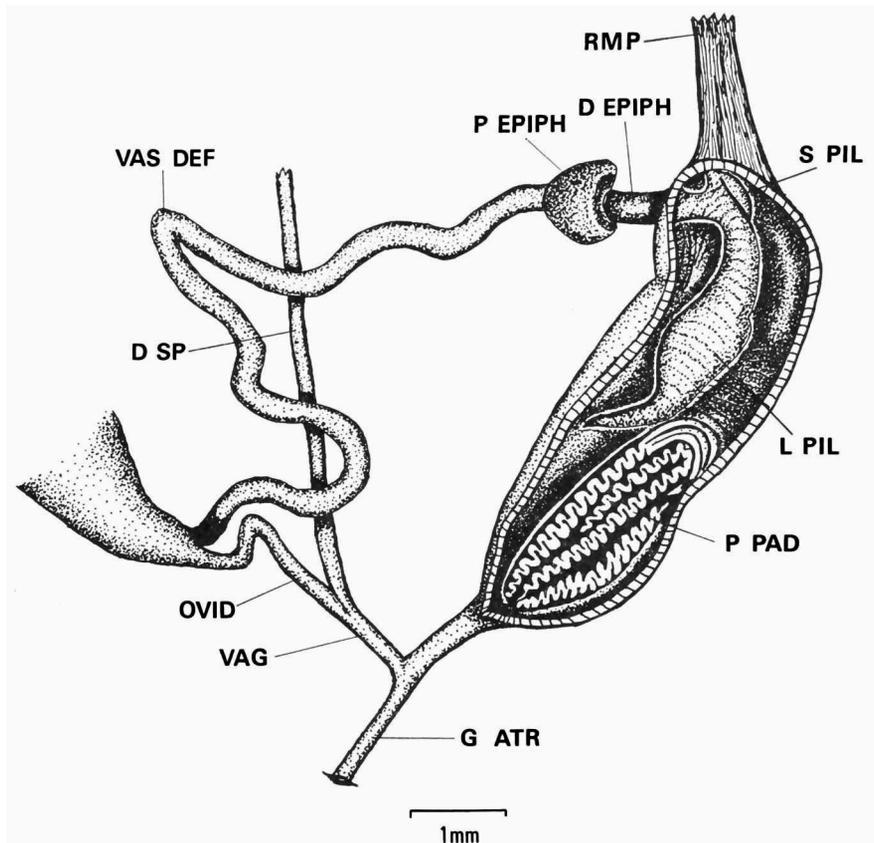


Fig. 11. *Trachycystis contrasta* spec. nov., distal part of genitalia with penis partly cut away to show its interior, D EIPH = distal part of epiphallus, D SP = duct of spermatheca, G ATR = genital atrium, L PIL = long penial pilaster, OVID = oviduct, P EIPH = proximal globular part of epiphallus, P PAD = penial pad, RMP = retractor muscle of penis, S PIL = short penial pilaster, VAG = vagina, VAS DEF = vas deferens.

the apex of the penis and stretches down its convex surface for a short distance. Except for the genital atrium being longer, there is a high degree of superficial similarity between this genital system and that of *T. leucocarina*.

The length of the lumen of the epiphallus is traversed by a ridge and the wall of the globular part of the epiphallus carries obliquely arranged lamellae which are extended onto the ridge similarly to the condition found in *T. leucocarina* (fig. 5). The ridge in the epiphallus is continued into the penis as the longer one of the penial pilasters. This long pilaster reaches from the apex of the penis through about half the length of the penial lumen (fig. 11). The shorter penial pilaster consists of a small ridge which originates in the apex of the penis and reaches distally for a very short distance. The opening of the epiphallus into the penial lumen is situated in the groove between the two pilasters.

An oval body, the penial pad, bulges into the lumen of the penis in the same way as the penial pad found in *T. leucocarina*. This pad, however, differs from that of *T. leucocarina* in that about four crenulated ridges run lengthwise over its surface (fig. 11). The penis of four specimens of *T. contrasta* were dissected but no linguiform structure, like the one sometimes found on the penial pad of *T. leucocarina*, was found. The absence of such a structure in these few dissected specimens, however, does not prove that it may not be secreted when needed.

Holotype: South Africa, Cape Province, Hottentots Holland Nature Reserve, Landdroskloof, 34°02' S 18°59' E, altitude 1350 m, 12 April 1979, leg. W. F. Sirgel (Natal Museum specimen no. B1153, holotype no. T2301). Paratypes: same data (paratypes nos. 1 & 6); *ibidem*, 21 September 1976, leg. W. F. Sirgel (paratypes nos. 2, 3, 4, 5). Apart from the numbered paratypes there are three unnumbered paratypes from the same locality. All the material is preserved in alcohol and has been divided among the following institutions: British Museum (Natural History), London — paratype no. 2; Rijksmuseum van Natuurlijke Historie, Leiden — paratype no. 1 and one unnumbered paratype; Musée Royal de l'Afrique Centrale, Tervuren, Belgium — paratype no. 3; South African Museum, Cape Town — paratype no. 4; Natal Museum, Pietermaritzburg, South Africa — paratype nos. 5, 6 and the remaining unnumbered paratypes. These institutions have also been supplied with dry shells.

Although the shell of *T. contrasta* conforms to that of *T. leucocarina* and *T. tollini* in colour and absence of costae in the sculpture, it can be easily distinguished from them. It differs from *T. leucocarina* in not having a channelled suture. It differs from *T. tollini* by not having spirals on the protoconch, the shell being imperforate, whorls being slightly less convex and the spire slightly less exerted. The whorls of *T. contrasta* are evenly rounded reaching their greatest diameter at the periphery of each whorl. In *T. tollini*

each whorl reaches its greatest diameter somewhat dorsal to its periphery. This results in the shells of the two species having a slight difference in profile. The unserrated keel on the hinder part of the foot of *T. contrasta* also distinguishes it clearly from *T. tollini* with a serrated keel. In some specimens of *T. tollini* these serrations are less intensely pigmented. This feature thus tends to resemble the unpigmented keels found in *T. leucocarina* and *T. contrasta*. There is such a high degree of similarity between the shells of *T. contrasta* and *T. (Liparocystis) delicata* (Melvill & Ponsonby, 1895) that they could be easily confused. A thorough investigation of shells of *T. delicata*, in the collection of the South African Museum as well as of a specimen I collected at Knysna, show the following differences between the two species. The spiral sculpture just below the suture is weaker and closer in *T. delicata* and the whorls have a very faint blunt peripheral angulation. No sign of such an angulation is present in *T. contrasta*. The shell of *T. contrasta* is basally more inflated. These features result in the profile of the shell of *T. contrasta* being more globose, while in *T. delicata* it looks slightly more like a flat cone. The columella of *T. delicata* is more vertical. Externally there are clear differences between the other parts of these two species. The laterally compressed foot of *T. delicata* is much shorter and does not have an unpigmented keel while the tentacles are completely black. Furthermore, its radula differs clearly, the endocones of the marginals being strongly curved and having accessory cusps (Watson, 1934), while the endocones of these teeth in *T. contrasta* are less curved and undivided.

A few specimens of *T. biscalpta* and *T. tollini* were dissected for comparison of the internal anatomy of the penis with that of *T. leucocarina* and *T. contrasta*. They all possess a long and a short penial pilaster as well as a penial pad. Although resembling the penial pad of *T. contrasta* in the possession of longitudinal crenulated ridges the penial pad of *T. tollini* is more slender and elongated and resembles the distal part of the long penial pilaster. Solem (1976) describes a penial morphology in Endodontidae of the Pacific Islands, which basically corresponds with the morphology of the *Trachycystis* species considered here, in having two penial pilasters. He points out that in the genus *Taipidon* Solem, 1976, the penial pilasters are broken up into a series of bumps (Solem, 1976). I believe that a similar development took place in *Trachycystis* resulting in the penial pad being a homologue of a separated distal bump of the short penial pilaster. Solem's further remark that the Pacific Island Charopidae normally have circular or pocket-like stimulatory pads or pilasters recalls the condition found in one of the South African Arionidae, a family believed to have its origin in the Endodontidae, namely *Oopelta polypunctata* Collinge, 1901. The penis of *O. polypunctata*

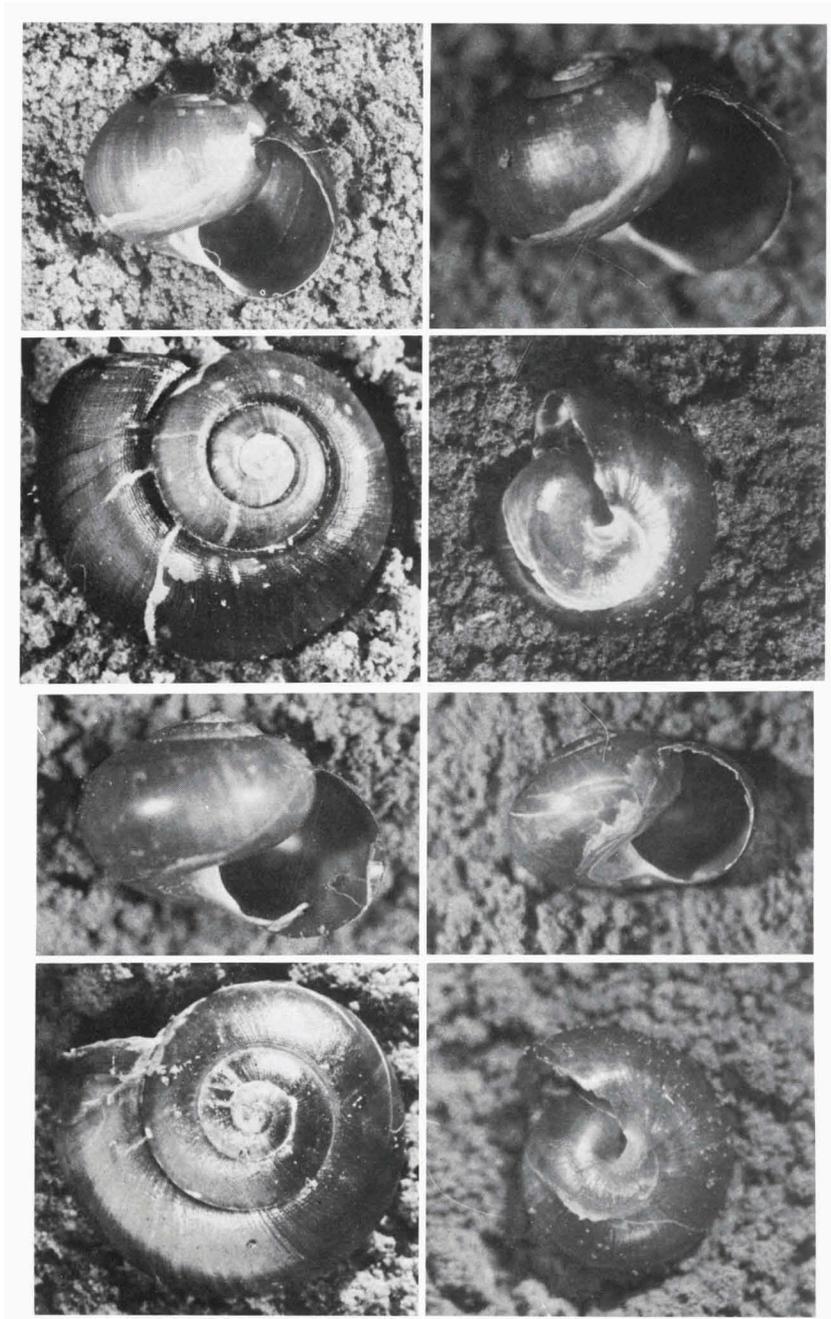
has a muscular pocket-like evagination, the stimulator sack (Altena, 1966). It is suggested that this stimulator is homologous to the penial pad of the *Trachycystis* species considered here and that it evolved by the penial pad having evaginated resulting in the pocket-like structure.

When disturbed the foot of both the new *Trachycystis* species exhibits violent writhing movements which are so strong that the front part of the body and the shell is thrown from side to side. Pilsbry (1948) mentions that similar behaviour in the family Arionidae is unique to the genus *Hemphillia* Bland & Binney, 1872. He points out that it has also been found in Philippine snails referred to *Helicarion* Férussac, 1822.

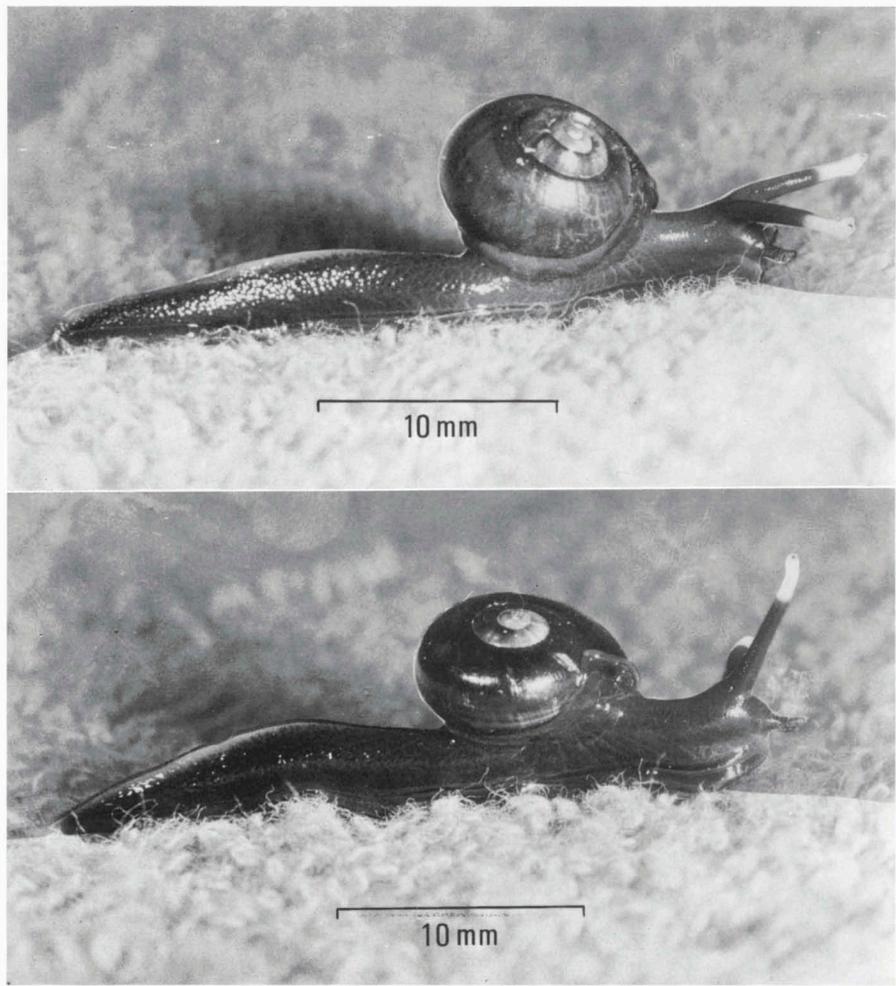
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Above *Trachycystis leucocarina* spec. nov., shells, maj. diam. 11.8 mm. — Below *Trachycystis contrasta* spec. nov., shells, maj. diam. 10.1 mm.



Trachycystis leucocarina spec. nov. (above) and *T. contrasta* spec. nov. (below).