

**CATALOGUE OF THE SOLARIIDAE
IN THE
RIJKSMUSEUM VAN NATUURLIJKE HISTORIE
I. SOLARIUM S.S.**

by

CH. BAYER

I propose in this part of my catalogue of the Solariidae to deal only with the genus *Solarium* s.s. and to reserve the remaining genera of this family for the next publication. For the division of the Solariidae in genera I followed Thiele's Handbuch der systematischen Weichtierkunde, also as far as concerns the names. Not only did I mention those species of which we possess specimens in the Leiden Museum, but, like in the former catalogues, I have included also, as far as possible, those species of which no material is present in our collections.

The list is composed on the same lines as my previous ones. Of all species of which we possess material a list is given of the specimens, stating: 1) the letter which indicates specimens from the same locality and collector (donor), as far as they are kept dry; in case of specimens preserved in spirit the number of the jar is given instead, 2) the number of specimens, 3) the locality, 4) the collector or donor. When the locality or collector (donor) is unknown, I have placed a question mark instead.

A special word of thanks is due to Dr. W. Adam for his kind help, afforded during my stay in the Musée Royal d'Histoire Naturelle de Belgique at Brussels and to Mr. R. Winckworth who was so good as to copy for me a long description with many figures, which was not obtainable in the libraries in Holland or Belgium.

Many names have been used by the authors for the different cingula (zonae, vittae, lirae) and sulci of the *Solarium*'s and in some cases different authors have applied the same name to different cingula, what may be a cause of confusion. For the sake of clearness I have combined the principal terms in a list for a case where all sulci and cingula are present, as for instance in *S. maximum* Phil. Where a sulcus or a cingulum was only described or where there was no adequate name extant in literature, I have for convenience's sake given a name in quotation marks.

The cingula, resp. vittae, are given in Roman numerals.

The sulci are given in Arabic numerals.

DISCUS	SUPERIOR	anfractus penultimus	I cingulum suturale 1 sulcus spiralis II cingulum infra-suturale 2 sulcus „secundus” III cingulum tertium 3 sulcus „tertius” IV cingulum supra-suturale = cingulum quartum
	DISCUS	anfractus ultimus	sutura I cingulum suturale = cingulum supremum = zona suprema = cingulum superius = zona superior = vitta superior = cingulum primum 1 sulcus spiralis = sulcus infra-suturalis = sulcus primus II cingulum infra-suturale = vitta infra-suturalis = cingulum secundum 2 sulcus „secundus” III area media = cingulum tertium 3 sulcus „tertius” IV cingulum penultimum = cingulum basale (superius) = cingulum quartum 4 sulcus peripheralis = sulcus (superior) peripheriae = sulcus quartus V cingulum ultimum = cingulum basale (infimum) = cingulum marginale (pars superior) = cingulum peripherale (pars superior) = cingulum inferius = cingulum quintum
DISCUS INFERIOR	S. BASIS		carina IV cingulum „externum” = cingulum marginale (pars inferior) = cingulum peripherale (pars inferior) 3 sulcus „externus” = sulcus (inferior) peripheriae III cingulum infra-peripherale II area basalis media 2 sulcus „medius” I cingulum proxumbilicale = cingulum internum 1 sulcus „internus” crenae umbilici umbilicus

See also fig. 1.

Genus *Solarium* Lamarck, 1799

S. bairdii Hanley

Solarium (Architectonica) Bairdii Hanley, Sowerby, Thesaurus Conchyl., vol. 3, p. 231, pl. 4, figs. 48, 49; 1863 (1866).

Solarium Bairdii, Marshall, Tryon, Manual of Conch., vol. 9, p. 13, pl. 4, figs. 49, 50; 1887.

Solarium Bairdi, Paetel, Cat. Conch. Samml., vol. 1, p. 285; 1887.

Type locality: ?; ? (Tryon); ? (Paetel).

S. cumingii Hanley

Solarium cumingii Hanley, Proc. Zool. Soc. London, p. 204; 1862.

Solarium (Architectonica) Cumingii, Hanley, Sowerby, Thesaurus Conchyl., vol. 3, p. 232, pl. 4, figs. 44, 45; 1863 (1866).

Solarium Cumingii, Reeve, Conch. Icon., Solarium, sp. 3, pl. 1, fig. 3; 1864.

Solarium Cumingii, Marshall, Tryon, Manual of Conch., vol. 9, p. 13, pl. 5, figs. 57, 58; 1887.

Solarium Cumingi, Paetel, Cat. Conch. Samml., vol. 1, p. 285; 1887.

Type locality: ?; ? (Reeve); ? (Tryon); ? (Paetel).

This *Solarium* is related to *S. fuliginosum* Hinds.

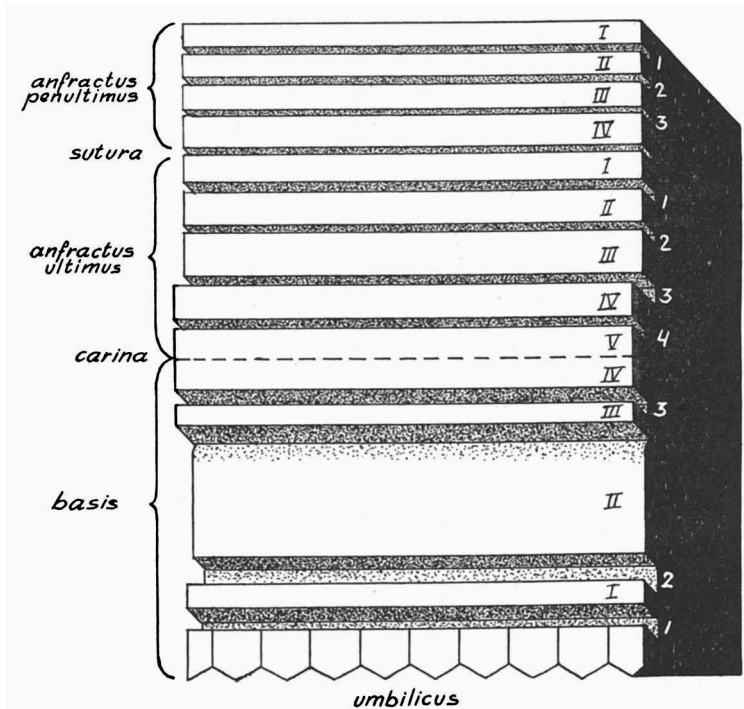


Fig. 1. Diagrammatic figure, showing the different cingula and sulci which may occur in a *Solarium*.

S. dunkeri Hanley

Solarium dunkeri Hanley, Proc. Zool. Soc. London, p. 204; 1862.

Solarium (Architectonica) Dunkeri, Hanley, Sowerby, Thesaurus Conchyl., vol. 3, p. 233, pl. 3, figs. 29, 30; 1863 (1866).

Solarium Dunkeri, Reeve, Conch. Icon., Solarium, sp. 17, pl. 3, fig. 17; 1864.

Solarium Dunkeri, Marshall, Tryon, Manual of Conch., vol. 9, p. 9, pl. 2, figs. 26, 27; 1887.

Solarium Dunkeri, Paetel, Cat. Conch. Samml., vol. 1, p. 286; 1887.

Solarium Dunkeri, Hidalgo, Catalogo mol. test. Filipinas, p. 187; 1904—1905.

Type locality: "Insulas Indiae orientalis".

S. fuliginosum Hinds

Solarium fuliginosum Hinds, Proc. Zool. Soc. London, p. 158; 1844.

Solarium maculatum Reeve, Elements of Conch., vol. 1, p. 144, pl. 13, fig. 62; 1848 (1860).

Solarium fuliginosum, Philippi, Martini & Chemnitz, Syst. Conch. Cab., vol. 2, part 7, p. 38, No 46; 1853.

Solarium (Architectonica) fuliginosum, Hanley, Sowerby, Thesaurus Conchyl., vol. 3, p. 234, pl. 2, figs. 13, 14; 1863 (1866).

Solarium fuliginosum, Reeve (pars), Conch. Icon., Solarium, sp. 6, pl. 1, fig. 6b; 1864.

Solarium fuliginosum, Marshall, Tryon, Manual of Conch., vol. 9, p. 13, pl. 4, figs. 47, 48; 1887.

Solarium fuliginosum, Paetel, Catal. Conch. Samml., vol. 1, p. 286; 1887.

Type locality: ?; ? (Tryon); ? (Paetel).

S. maculatum Rv. differs only a little from *S. fuliginosum* in pattern. The obliquely radiating, broad, dark brown flames are interrupted in their lower part and continue a little sideways in the same direction, whereas the dots on the cingulum ultimum are placed a trifle farther from one another.

var. or monstr. **hanleyi** (Sowerby)

Solarium (Architectonica) Hanleyi Sowerby, Thesaurus Conchyl., vol. 3, p. 234, pl. 2, figs. 15, 16; 1863 (1866).

Solarium fuliginosum, Reeve (pars altera), Conch. Icon., Solarium, sp. 6, pl. 1, fig. 6a (non 6b); 1864.

Type locality: ?; ? (Reeve).

S. grandiosum (Iredale)

Architectonica grandiosa Iredale, Rec. Austral. Mus. Sydney, vol. 18, p. 228, pl. 25, figs. 19, 20; 1931.

Type locality: not mentioned, probably New South Wales.

The illustration of this *Solarium* reminds vaguely of *S. maximum* Phil., from which it differs, however, as the sculpture, the radiating striae as well as the spiral grooves, become obsolete on the last whorl. The base, however, does not resemble at all that of *S. maximum* and is very striking by its peculiar pattern of spots placed in radiating rows.

S. impressum Nevill

Solarium impressum Nevill, Journ. Asiatic Soc. Bengal, vol. 38, p. 162, pl. 17, fig. 11; 1869.

Solarium impressum, Marshall, Tryon, Manual of Conch., vol. 9, p. 14, pl. 4, figs. 52 a, b; 1887.

Solarium impressum, Paetel, Cat. Conch. Samml., vol. 1, p. 286; 1887.

Type locality: "S. Prov. Ceylon".

By its round, scarcely carinated, body whorl and the granose cingula, this species of 5¹/₂ mm has a remote resemblance to a *Torinia*. Nothing, however, is said concerning the operculum, and Nevill's figure is too small and too coarsely executed to discern here clearly all details. Consequently it is on the authority of Marshall and Paetel that I retain this species in the genus *Solarium*.

S. laevigatum Lamarck

- Solarium laevigatum* Lamarck, Anim. s. Vert., vol. 7, p. 3, No 3; 1822.
Solarium laevigatum, Kiener, Icon. coq. viv., Solarium, p. 5, No 3, pl. 2, fig. 3; 1838—1839.
Solarium laevigatum, Deshayes, Lamarck, Anim. s. Vert., 2nd ed., vol. 9, p. 98, No 3; 1843.
Solarium laevigatum, Philippi, Zeitschr. f. Malakozool., vol. 5, p. 169, No 46; 1848 (1849).
Solarium laevigatum, Philippi, Martini & Chemnitz, Syst. Conch. Cab., vol. 2, part 7, p. 17, No 14, pl. 3, fig. 4; 1853.
Solarium (Architectonica) laevigatum, Hanley, Sowerby, Thesaurus Conchyl., vol. 3, p. 233, pl. 2, figs. 21, 22; 1863 (1866).
Solarium laevigatum, Reeve, Conch. Icon., Solarium, sp. 9, pl. 2, fig. 9; 1864.
Solarium laevigatum, Marshall, Tryon, Manual of Conch., vol. 9, p. 12, pl. 4, figs. 43, 44; 1887.
Solarium laevigatum, Paetel, Cat. Conch. Samml., vol. 1, p. 286; 1887.

Type locality: ?; "la mer des Indes" (Kiener).

Our specimens of *S. laevigatum* show a notable variation as far as concerns the angle measured at the top of the shell and the height, the varying convexity of the profile of the spire, the diameter of the umbilicus, the number and dimensions of the umbilical crenulations and also the acuity of the periphery. In relation herewith it should be possible to discern several varieties or forms.

- a. 4.?, ? — b. 2. Karachi, Sind (Bombay Pres.), G. B. Sowerby. — c. 3. Tjilatjap (S. Java), C. Overdijk. — d. 1. Tjilaoeteureun (S. Java), L. de Priester. — e. 1. Karang Hawoe (S. W. Java), W. C. van Heurn. — f. 3. Wijnkoopsbaai (S. W. Java), L. de Priester. — g. 1. Denpasar (S. Bali), L. de Priester. — h. 1. Boesak (N. Celebes), ? — i. 1. Mount Lavinia (Ceylon), J. Knock. — j. 1. Djask (Gulf of Oman), Ottens. — k. 1. Durban (Natal), Miss M. J. de Graag.

S. maximum Philippi

- Trochus Perspectivus Australis* Chemnitz, Syst. Conch. Cab., vol. 11, p. 162, pl. 196, figs. 1884, 1885; 1795.
Solarium maximum Philippi, Zeitschr. f. Malakozool., vol. 5, p. 170, No 47; 1848 (1849).
Solarium australe (non Phil.) Mörch, Catal. conch. Yoldi, Cephalophora, p. 47; 1852.

- Solarium maximum*, Philippi, Martini & Chemnitz, Syst. Conch. Cab., vol. 2, part 7, p. 6, No 2, pl. 1, figs. 2, 3; 1853.
Solarium (Architectonica) maximum, Hanley, Sowerby, Thesaurus Conchyl., vol. 3, p. 229, pl. 1, figs. 5, 6; 1863 (1866).
Solarium maximum, Reeve, Conch. Icon., Solarium, sp. 4, pl. 1, fig. 4; 1864.
Solarium maximum, Marshall (pars), Tryon Manual of Conch., vol. 9, p. 9, pl. 3, figs. 31, 32 (tantum); 1887.
Solarium maximum, Paetel, Cat. Conch. Samml., vol. 1, p. 286; 1887.
Solarium maximum, Hedley, Scient. res. trawling exp. „Thetis”, Memoirs Austral. Mus., 4, part 6, p. 349, fig. 73; 1903.
Architectonica maxima, Hedley, Journ. Roy. Soc. New S. Wales, vol. 51, suppl., p. 101; 1917 (1918).

Type locality: ?; “China” (Mörch); “Java, Ceylon” (Reeve).

Philippi quotes with his diagnosis the figure: Chemn. XI. t. 196. f. 1884.85, which citation is mentioned again in his monograph of *Solarium* (1853, p. 6, No 2) with the observation “bene!”. This drawing is rather mediocre and corresponds in pattern not completely with Philippi’s diagnosis, neither with the illustration of this author in the above mentioned monograph, although some forms of *S. maximum* may show this divergence. The cingulum infra-suturale, namely, is mentioned and pictured by Philippi (1853, pl. 1, fig. 3) as immaculate, while in the *Solarium* on the figure of Chemnitz it is partly covered with spadiceous dots on a great part of the body whorl.

a. 1. ?, from Dalen’s collection. — b. 1. Moluccas, G. Sootweg. — c. 1. ?, G. Sootweg. — d. 1. Durban (Natal), Miss M. J. de Graag. — e. 1. Carolines, D. E. Schmeltz.

S. modestum Philippi

- Solarium modestum* Philippi, Zeitschr. f. Malakozool., vol. 5, p. 171, No 50; 1848 (1849).
Solarium modestum, Philippi, Martini & Chemnitz, Syst. Conch. Cab., vol. 2, part 7, p. 15, No 11, pl. 3, fig. 1; 1853.
Solarium (Architectonica) modestum, Hanley, Sowerby, Thesaurus Conchyl., vol. 3, p. 229, pl. 1, figs. 11, 12 and pl. 3, figs. 27, 28; 1863 (1866).
Solarium modestum, Reeve, Conch. Icon., Solarium, sp. 12, pl. 2, fig. 12; 1864.
Solarium modestum, Marshall, Tryon, Manual of Conch., vol. 9, p. 9, pl. 2, figs. 22, 23; 1887.
Solarium modestum, Paetel, Cat. Conch. Samml., vol. 1, p. 286; 1887.
Solarium modestum, Hidalgo, Catalogo mol. test. Filipinas, p. 187; 1904—1905.

Type locality: ?; “China; Society Islands” (Reeve).

In his diagnosis Philippi states: “cingulis duobus infimis lira elevata divisis” and further in the description he lays stress on it with the words: “inter cingulum marginale et penultimum baseos lira elevata”. This character, however, is not at all constant, in the same manner as in *S. perspectivum* (L.) (e.g., q. Madoera, from E. F. Jochim’s collection),

this lira appears in all degrees of development and can even be quite lacking (g. Wijnkoopsbaai [S. W. Java], E. E. W. G. Schröder).

Our specimens differ more or less in height and in the convexity of the whorls.

One specimen (n. Tjilatjap [S. Java], C. Overdijk) shows a curious aberration, as it coils on the cingulum ultimum instead of on the sulcus peripheralis above it. The suture in consequence is no more canaliculate but perangusta and the whole form more conical.

Another peculiarity of this specimen is that the cingulum suturale is absent here, so that the brown cingulum infra-suturale borders immediately the suture, and the last whorl thus shows 4 cingula instead of 5. The whorls above the body whorl show, however, the normal number of cingula that is visible there, namely 4, whereas, in relation to the absence of the cingulum suturale, one should expect only 3 cingula. That the number of cingula is still 4 results from the fact that, on account of the coiling of the shell on the cingulum ultimum, one more cingulum has become visible. One therefore sees on the whorls of the spire of this *Solarium* in sequence: the cingulum infra-suturale, the cingulum tertium, the cingulum supra-suturale (= the cingulum penultimum of the body-whorl), and the cingulum ultimum, whereas a normally developed specimen shows: the cingulum suturale, the cingulum infra-suturale, the cingulum tertium, the cingulum supra-suturale.

a. 1. Timor, Zijnen Wartel. — b. 1. Larantoeka (E. Flores), J. Semmelink. — c. 1. Manoekwari, Doreh-baai (N. W. New Guinea), from E. F. Jochim's collection. — d. 3. Tjilatjap (S. Java), C. Overdijk. — e. 1. Padang W. Sumatra), E. Jacobson. — f. 1. Amboyna, D. J. Hoedt. — g. 3. Wijnkoopsbaai (S. W. Java), E. E. W. G. Schröder. — h. 6. Boesak (N. Celebes), ? — i. 1. Halmahera (Moluccas), G. Sloopweg. — j. 1. Banda Is., from E. F. Jochim's collection. — k. 1. Nossi Bé near Madagascar, F. Pollen & van Dam. — l. 2. Indian Ocean, C. G. C. Reinwardt. — m. 3. ?, from Hoo-geveen's collection & L. K. A. Muysken. — n. aberratio. 1. Tjilatjap (S. Java), C. Overdijk. — 1249. 1. Amboyna, E. A. Forsten.

S. nobilis (Roeding)

Architectonica Nobilis Roeding, Bolten, Mus. Boltenianum, p. 78, No. 1025; 1798.

Solarium granulatum (non Philippi) Lamarck, Anim. s. Vert., vol. 7, p. 3, No 2; 1822.

Solarium granulatum, Deshayes, Lamarck, Anim. s. Vert., 2nd ed., vol. 9, p. 98, No 2; 1843.

Solarium verrucosum Philippi, Zeitschr. f. Malakozool., vol. 5, p. 172, No 53; 1848 (1849).

Solarium nobile, Mörch, Catal. conch. Yoldi, Cephalophora, p. 47; 1852.

Solarium verrucosum, Philippi, Martini & Chemnitz, Syst. Conch. Cab., vol. 2, part 7, p. 10, No 6, pl. 2, figs. 5, 6; 1853.

- Architectonica nobilis*, Mörch, Malakoz. Bl., vol. 6, p. 122; 1859.
Architectonica granulata, Mörch, Malakoz. Bl., vol. 6, p. 123; 1859.
Solarium granulatum, Carpenter, Proc. Zool. Soc. London, p. 355; 1863.
Solarium (Architectonica) nobile, Hanley, Sowerby, Thesaurus Conchyl., vol. 3, p. 230, pl. 4, fig. 35; 1863 (1866).
Solarium (Architectonica) granulatum, Hanley, Sowerby, Thesaurus Conchyl., vol. 3, p. 231, pl. 1, figs. 1, 2; 1863 (1866).
Solarium granulatum, Reeve, Conch. Icon., Solarium, sp. 7, pl. 2, fig. 7; 1864.
Solarium verrucosum, Reeve, Conch. Icon., Solarium, sp. 8, pl. 2, fig. 8; 1864.
Architectonica nobilis, Mörch, Malakoz. Bl., vol. 22, p. 154; 1875.
Solarium granulatum, Marshall, Tryon, Manual of Conch., vol. 9, p. 11, pl. 5, figs. 53, 54; 1887.
Solarium verrucosum, Marshall, Tryon, Manual of Conch., vol. 9, p. 12, pl. 3, figs. 37, 38; 1887.
Solarium granulatum, Paetel, Cat. Conch. Samml., vol. 1, p. 286; 1887.
Solarium granulatum, Dall, Bull. Mus. Comp. Zool. Harvard Coll. Cambridge, vol. 18, p. 274; 1889.
Architectonica nobilis, Tomlin & Shackleford, Journ. of Conch., vol. 14, p. 252; 1914.
Architectonica granulata, Zetek, Rev. Nueva, vol. 5, p. 538; 1918.
Solarium granulatum, Dautzenberg, Rev. Zool. Africaine, vol. 9, p. 155; 1921.

Type locality: ?; ? (Lamarck); "Haiti, Vera Cruz" (Mörch); "Cape St. Lucas, Gulf of Mexico" (Carpenter). See below.

Philippi has caused here some confusion by calling a related species "*S. granulatum* Lm." and giving another name, namely: *S. verrucosum*, to the true *S. granulatum* Lm. He is, however, forced to confess (1853, p. 11, No 6): "Die Diagnose von Lamarck's *S. granulatum* passt bis auf die Färbung vollkommen auf unser *verrucosum*". The cause of this error is that Lamarck has omitted, after his diagnosis, to quote Chemnitz, Syst. Conch. Cab., pl. 172, fig. 1695—1696; 1781: "da Lamarck indessen unsere sehr charakteristische Figur nicht citirt", writes Philippi (1853, p. 11, No 6), "müssen wir wohl glauben, dass Kiener Recht hat, indem er eine andere Form mit viel weiterem Nabel, welche nur einen gekörnten Gürtel um den Nabel herum besitzt, als das Lamarck'sche *S. granulatum* abbildet". The figure of Chemnitz in question represents a juvenile specimen of *S. granulatum* Lm., where the granules are coarser than in fully developed ones. This illustration indeed is very characteristic and probably through oversight Lamarck has not entered it among his citations; such an omission happened to Linné himself, who quoted a moderate or a wrong picture and overlooked the typical one in the same publication, as I showed already earlier (Bayer, 1937, p. 44).

The diagnosis of Lamarck, although not extensive, is very clear in its brevity and is well completed by the characteristic figure in the Encyclopédie méthodique (pl. 446, fig. 5 a, b) and that of Lister (1685, pl. 634, fig.

22) which, though not irrefragable, is anyhow clear enough to recognize it as *S. granulatum* Lm.

From the statements in literature it appears that this species is found on the West- as well as on the East-coast of subtropical and tropical America (Gulf of California, N. Carolina, Mexico, Central America, Ecuador, Venezuela, Surinam, Antilles). In the Atlantic its area of distribution extends Eastward as far as the Westcoast of Africa (Sao Thomé, Cameroun, Congo).

That the specimens, found on the West- and on the East-coast of America, indeed belong to the same species, is also confirmed by the statement of Carpenter (1863, p. 355): "... I have been able to examine a large number of specimens collected at Cape St. Lucas by Mr. Xantus, and in the Gulf of Mexico. I know of no mark by which to distinguish the shells from the two oceans. From each locality they vary greatly in the size of the umbilicus, and in the strength of sculpture, number of knobs, &c. I should consider them all as varieties of *S. granulatum*, Lam". Dall (1889a, p. 274) expresses himself in the same sense: "The East and West American forms differ very slightly", and Dautzenberg (1921, p. 157) remarks in relation herewith: "Nous rappellerons qu'on a aussi constaté la présence de certains autres Mollusques, à la fois sur le littoral pacifique de l'Amérique du Sud et, dans l'Océan Atlantique jusque sur les côtes de l'Afrique Occidentale."

As completion I give here a list of localities of this *Solarium* compiled from literature.

West coast of America:

- Cape San Lucas (Lower California) (Carpenter)
- Mazatlan (Menke)
- Bay of Salinas (Pacific coast of Costarica) (Dautzenberg)
- Panama (Zetek)
- Perlas Is. (Panama) (Boone)
- Esmeraldas (Ecuador) (Dautzenberg)

East coast of America:

- Hatteras (N. Carolina) (Dall)
- Northeastern Mexico (Hinkley)
- Gulf of Mexico (Carpenter)
- Vera Cruz (Mörch, Museum Brussels)
- Haiti (Menke)
- St. Thomas (Mörch)
- Sombrero (Dall)
- Guadeloupe (Deslongchamps)

Martinique (Museum Brussels)
 Aruba (Museum Leiden)
 Venezuela (Museum Leiden)
 Surinam (Museum Leiden)

West coast of Africa:

Saint Vincent (Cape Verdes) (Tomlin & Shackleford)
 Sao Thomé (Nobre, Tomlin & Shackleford)
 Congo (Museum Leiden)
 Duala (Cameroun) (Dautzenberg)

If in Fischer's lists of molluscs of the Panamic and the Caribbean sub-region (1887, p. 168) we leave out of consideration those species of the Pacific side which are very closely related to these of the Caribbean Sea, and from which 12 are quoted by this author, there remain 8 species of molluscs which are found on the West side as well as on the East side of Central America.

According to many naturalists (Fischer, Cooke, Simroth, Dall, &c.) the presence of certain species of molluscs, on both sides of the isthmus of Panama, may have its cause in the communication of the Caribbean Sea with the Pacific Ocean in the Tertiary. In relation to the distribution of a Lamellibranchiate (*Verticordia ornata* Orb.) Haas (1938, p. 409) observes that this mollusc "nicht nur der kalifornischen und der japanischen Provinz gemeinsam ist, sondern . . . auch noch im Antillen-Meer vorkommen soll und . . . somit, wenn die Angabe wirklich zu Recht besteht, bedeutsame Ausblicke über ehemalige interozeanische Verbindungen etwa quer über Mittel-Amerika hinweg eröffnet."

Zetek (1918, p. 511) mentions that the isthmus of Panama did not exist till about the end of the Miocene and that at the time a strong circumaequatorial current moved from the East to the West, which should have contributed to the transport of molluscs from the Caribbean Sea to the Pacific Ocean. He concludes: "Estos acontecimientos de los periodos Eoceno y Oligoceno explican el por qué encontramos en el oeste especies que son primariamente del Caribe". The peculiar distribution of *S. nobile* (Roed.) (= *S. granulatum* Lm.) may be explained by this hypothesis.

a. 5. Surinam, from Dalen's collection. — b. 1. Congo, ? — c. 3. ?, from Hoogeveen's collection. — d. 1. Puerto Cabello (Venezuela), L. de Priester. — e. 2. ?, ? — f. 1. Oranjestad (Aruba), D. J. Kienjet.

S. ordinarium Smith

Solarium ordinarium Smith, Proc. Zool. Soc. London, p. 281, pl. 21, figs. 17, 17a, 17b, 1890.

Type locality: "St. Helena".

S. perdix Hinds

Solarium perdix Hinds, Proc. Zool. Soc. London, p. 22, No 3; 1844.

Solarium perdix, Hinds, Zool. Voyage Sulphur, p. 50, pl. 14, figs. 3, 4; 1844.

Solarium perdix, Philippi, Martini & Chemnitz, Syst. Conch. Cab., vol. 2, part 7, p. 8, No 5, pl. 1, figs. 8, 9; 1853.

Solarium (Architectonica) perdix, Hanley, Sowerby, Thesaurus Conchyl., vol. 3, p. 233, pl. 2, figs. 17, 18; 1863 (1866).

Solarium perdix, Reeve, Conch. Icon., Solarium, sp. 1, pl. 1, fig. 1; 1864.

Solarium perdix, Marshall, Tryon, Manual of Conch., vol. 9, p. 9, pl. 2, figs. 24, 25; 1887.

Solarium perdix, Paetel, Cat. Conch. Samml., vol. 1, p. 286; 1887.

Architectonica perdix, Hedley, Journ. Roy. Soc. W. Austral., vol. 1, p. 46; 1916.

Type locality: "Ceylon; north-west coast of Australia".

The specimens vary slightly in height, but this difference is less than which is found, for instance, between *S. perspectivum* and its variety *formosa*; the more elevated form is here the most typical. A few specimens show below the sulcus spiralis a series of little rufous dots (e.g., i. Madoera, from E. F. Jochim's collection).

a. 1. Indian Ocean, ? — b. 2. Maroenda near Tandjoeng Priok (Java), L. de Priester. — c. 1. Batavia (Java), W. C. van Heurn. — d. 2. Antjol near Batavia, F. P. Koumans. — e. 1. Toeбан, res. Rembang (N. E. Java), D. J. Kienjet. — f. Sarang, res. Rembang (N. E. Java), W. F. Krijnen. — g. 2. Pasoeroean (E. Java), J. Knock. — h. 1. Japara (N. Java), W. F. Krijnen. — i. 4. Madoera, from E. F. Jochim's collection. — j. 1. Madoera, from E. F. Jochim's collection. — k. 1. Zanzibar, L. de Priester.

S. perspectivum (L.) partim Sow. I

Trochus perspectivus Linné (pars), Syst. nat., ed. 10, p. 757, No 503; 1758.

Trochus perspectivus, Linné (pars), Mus. Ulricae, p. 646, No 329; 1764.

Trochus perspectivus, Linné (pars), Syst. nat., ed. 12, p. 1227, No 581; 1767.

Trochus perspectivus, Born (pars), Testac. Mus. Caes. Vindob., p. 328; 1780.

Trochus perspectivus, Gronovius (pars), Zoophylacium, p. 323, No 1484 & Index Vermium, No 1484; 1781.

Trochus perspectivus, Schröter (pars), Einl. Conchylienkenntn., vol. 1, p. 650; 1783.

Trochus perspectivus, Gmelin (pars), Linné, Syst. nat., ed. 13, p. 3566, No 3; 1790.

Architectonica Perspectiva, Roeding (pars), Bolten, Mus. Boltenianum, p. 78, No 1022; 1798.

Solarium perspectivum, Montfort (pars), Conchyl. syst., vol. 2, p. 163; 1810.

Trochus (Solarium) perspectivus, Brookes (pars), Introduction study Conchol., p. 123; 1815.

Trochus perspectivus, Dillwyn (pars), Descr. catal. recent shells, vol. 2, p. 784; 1817.

Solarium perspectivum, Lamarck (pars), Anim. s. Vert., vol. 7, p. 3, No 1; 1822.

- (?) *Solarium perspectivum*, Bowdich, Elements of Conchol., part 1, pl. 9, fig. 17; 1822.
Solarium perspectivum, Wood (pars), Index Testac., p. 137, pl. 29, fig. 62c; 1825;
 2nd ed. 1828.
Solarium perspectivum, Sowerby, Genera of shells, vol. 2, No 38, pl. 202; (1820—
 1825) 1831.
Solarium perspectivum, Kiener (pars), Icon. coq. viv., Solarium, p. 3, No 1; 1838—1839.
Solarium perspectivum, Deshayes (pars), Lamarck, Anim. s. Vert., 2nd ed., vol. 9,
 p. 97, No 1; 1843.
Solarium incisum Philippi, Zeitschr. f. Malakozool., vol. 5, p. 169, No 45; 1848 (1849).
Solarium incisum, Philippi, Martini & Chemnitz, Syst. Conch. Cab., vol. 2, part 7,
 p. 27, No 30, pl. 4, fig. 6; 1853.
 (non) *Architectonica perspectiva*, Adams, Genera rec. Moll., vol. 1, p. 243, pl. 25, fig. 6;
 1853 (1858).
 (non) *Solarium perspectivum*, Chenu, Manuel de Conchyl., vol. 1, p. 232, fig. 1352; 1859.
Solarium (Architectonica) perspectivum, Hanley, Sowerby, Thesaurus Conchyl., vol.
 3, p. 228, pl. 4 (253), figs. 36, 37, 38; 1863 (1866).
Solarium perspectivum, Reeve, Conch. Icon., Solarium, sp. 11, pl. 2, fig. 11b (non
 11a); 1864.
 (non) *Solarium perspectivum. Architectoma perspectiviva*, Gray, Figures of Moll. anim.,
 vols. 1 & 2, pl. 126, fig. 6; 1874.
 (?) *Solarium striatum. Architectoma* Gray, Figures of Moll. anim., vols. 1 & 2, pl.
 126*, fig. 2; 1874.
Solarium perspectivum, Fischer, Manuel de Conch., p. 715, pl. 9, fig. 15; 1887.
Solarium perspectivum, Marshall (pars), Tryon, Manual of Conch., vol. 9, p. 8; 1887.
Solarium perspectivum, Paetel, Cat. Conch. Samml., vol. 1, p. 287; 1887.
Solarium perspectivum, Hidalgo, Catalogo mol. test. Filipinas, p. 187; 1904—1905.
Architectonica perspectiva, Hedley, Journ. Roy. Soc. New S. Wales, vol. 51, suppl.,
 p. 101; (1917) 1918.
Architectonica perspectiva, Tomlin, Annals S. African Mus., vol. 25, p. 332; 1928.
Solarium perspectivum, King & Ping, Hong Kong Naturalist, vol. 2, p. 269, fig.
 4; 1931.

Locality: Indian Ocean.

Linné, as is shown by his citations, has included under his *Trochus perspectivus* a group of species of *Solarium*, which show only a superficial resemblance among each other. Already Gmelin separated from this group *Torinia straminea* and Lamarck *S. granulatum*, and according to Philippi also *S. laevigatum*, while Hinds (1844, p. 22—26) segregated 5 other species. Finally Philippi has formed a number of species derived from "*Trochus perspectivus* L."; thus from this "species" of Linné proceeded 15 species in all. This number, however, is much too high, as all these species are not valid; a few (*S. trochleare* Hinds, *S. formosum* Hinds, *S. australe* Phil.) are varieties only, whilst some (*S. incisum* Phil., *S. stellatum* Phil., *S. granulatum* [non Lm.] Phil., *S. zonatum* Phil.), if one wishes not to regard them as synonyms, can be considered as forms only. All this, however, shows clearly that under the name *Trochus perspectivus* more than one species are included.

According to Hanley (1855, p. 314) Linné in his *Systema* should "have regarded all the larger *Solaria* as mere varieties of the same shell", but in the Museum Ulricae should have designated *S. formosum* Hinds (= *S. perspectivum* auct. var.) with the name *Trochus perspectivus*. Perhaps the specimens of the Museum Ulricae indeed were *S. formosum* Hinds, and Linné intended to indicate, on p. 646, by his description and citations, those forms included into his collective name, *Trochus perspectivus*, which most strongly resembled the specimens of the Museum. Indeed, in relation to the diagnosis and principally to the following passage: "Anfractus . . . ad basin cincti supra infraque costa elevata, lineari, articulata ex albo & fusco, & picti supra linea fusca, albae superinducta", one can suppose that here is meant a well defined species, namely, *S. perspectivum* auct. Linné's quotations, however, make the impression that, in this case too, he has not designated especially one of the species which later authors have separated from the group of *S. perspectivum*.

Linné quotes in the Museum Ulricae only:

Rumph. mus. t. 27. f. L. It is possible that this specimen, seen from the base, is *S. perspectivum* auct., but, as the figure is rather moderate and as the upper side is not figured, it is not possible to decide with certainty.

Gualt. test. 1. 65. f. O. On this plate 3 different species of *Solarium* are drawn. At the top is represented the base of *S. maximum* Phil. or of a related species. In the undermost series the topside and the base of a *Solarium* is figured, but not of a typical *S. perspectivum* auct., as 1) the cingulum suturale is totally white, instead of being bordered with brown, 2) the series of spots on the proximal side of the area basalis media is little developed. The most rightward placed shell of the ultimate row, according to Hanley (1863, p. 230), closely resembles *S. quadriceps* Hinds.

Argenv. conch. t. 11. f. M. represents the base of *S. perspectivum* or of a related form. As there is no figure of the upper side, it is not possible to decide with certainty if this is really *S. perspectivum* auct.

If, after the Museum Ulricae, no other paper of Linné's had appeared, one could perhaps agree with Hanley's (1855, p. 314) statement, that *S. formosum* Hinds was the species "which displays the best claim to be regarded as the typical *perspectivus*"¹⁾ and that in later years Linné had

1) In contradiction herewith Hanley (1863, p. 228) speaks in 1863 of "the Linnaean type of *Trochus perspectivus*". It is, however, unknown to me that between 1855 and 1863 an authentic type of this species was found, marked by Linné himself and agreeing with his diagnosis and citations; for Hanley considers justly the shells satisfying to this requirement only as a type „we may hold the marked shells to be conclusive testimony, whenever they accord with the published descriptions" (1855, p. 3).

in mind especially this *Solarium*. The *Systema Naturae* ed. 12 refutes, however, this supposition; in 1767 Linné has still an unchanged conception of his *Trochus perspectivus*, as is shown by the citations, which he transcribes almost unaltered from the 10th edition, and by the addition of a new reference, namely Seba (*Seb. mus.* 3. t. 40. f. 1, 2, 13, 14, 28, 41, 42) which points to figures of different *Solarium* species together. Gmelin too in the 13th edition of the *Systema Naturae* follows Linné's view.

Which author has now, from this group of "*Trochus perspectivus* L.", segregated more especially one species and distinguished it from the remaining by a typical figure or a clear description? More than seventy years passed before this happened, as all the authors before 1830 have no clearly defined conception of the species they understand under the name *S. perspectivum*.

On p. 326 of *Testacea Musei Caesarei Vindobonensis*, 1780, Born gives an illustration of a *Solarium*. This figure, quoted also by Gmelin under his citations of *S. perspectivum*, represents the base of a shell more or less resembling *S. modestum* Phil. In the same volume on p. 328 there is a description of *Trochus perspectivus*. The citations for the greater part are about the same as those quoted by Linné. The diagnosis, meanwhile, reminds of that of *S. nobile* (Roed.) (= *S. granulatum* Lm.) or *S. quadriceps* Hinds, as is shown by the following passage: "Anfractus transversim sulcati, striis obliquis incisus decussati, unde prope apicem superficies granulata, & anfractuum margo prope suturas crenulatus apparet" and a little farther: "Color albus pallidusve, maculis rarioribus fulvis."

In the *Zoophylacium* 1781, Gronovius mentions in the *Index Vermium*, under No 1484, *Trochus perspectivus*. Not alone, however, his diagnosis on p. 323 is that of a genus, but moreover, as appears from his quotations, the name, *Trochus perspectivus*, includes at least 4 species.

Schröter (1783, p. 650) gives the description of the genus *Solarium* or perhaps the diagnosis of the group of species, which Linné placed under his *Trochus perspectivus*, without distinguishing especially one. He quotes herewith most authors mentioned also by Linné.

It appears also from Roeding's catalogue (1798, p. 78, No 1022) that his *Architectonica perspectiva* is not a single species, as we find in his two quotations, illustrations of two different species of *Solarium*. The shell figured in Chemn. 5. t. 192 (errore pro 172). f. 1691. 1692. strongly resembles *S. maximum* Phil., the sulcus tertius, however, is a trifle too broad. Philippi (1853, p. 9) supposes that it is *S. granulatum* (non Lm.) Phil., this seems to me not very probable, as the radiating sculpture in the latter is more distinct than in the specimen of Chemnitz's plate; anyhow it

appears herefrom that the figure is not very clear. The other quoted illustration: Knorr I. t. II. f. 1. 2. resembles a variety of *S. perspectivum* auct.

Montfort (1810, p. 163) refers in his quotations to figures of at least 5 different species of *Solarium*. The few words, which he writes on p. 164 in relation to *S. perspectivum*, are quite insufficient to delineate this species, even approximately, whilst the figure on p. 162 representing the base is very moderate.

In his Introduction to the study of Conchology 1815, Brookes gives on p. 123 a diagnosis of the genus *Solarium* and refers to fig. 94 on pl. 7 as being a picture of *S. perspectivum*. This figure represents the base of a *Solarium*, the cingulum of castaneous dots at the proximal side of the area basalis media, which is typical for *S. perspectivum* auct., is, however, completely absent in the represented specimen. The base reminds more of that of *S. modestum* Phil., were it not that the latter has the crenae umbilici white, whereas on the figure they are coloured. It is true, that this difference with the normal pattern, namely the absence of dots on the proximal side of the area basalis media, occurs sometimes in *S. perspectivum* auct. too, in immaturity (s. Kagrmaksar, Aden, H. Strengers & L. E. Nobel) as well as in full grown specimens (aj. Madura, Mangold), but it is always an exception. The specimen in question differs, moreover, from *S. perspectivum* auct. in showing a clear vitta at the place where a dark one is dimly visible by transparency in the interior of the aperture of *S. perspectivum* auct.

On fig. 94a the top side of this *Solarium* is shown, a rather moderate drawing. Near the suture of the last whorl,—under the brown cingulum supra-suturale of the penultimate one,—is a white vitta followed by a brown of about the same width. This white vitta is blotched with brown dots covering the whole breadth of the vitta, in contradiction with *S. perspectivum* auct. where the cingulum suturale is divided lengthwise in two parts: the superior vitta of a brown colour, the inferior white. *S. modestum* Phil., of which the author (1848, p. 171) states: “zona suprema lactea... maculis ferrugineis obsolete adspersa”, has a pattern resembling somewhat that of the *Solarium* figured by Brookes. From all this it appears that it is not very clear which species the latter naturalist has represented as *S. perspectivum*.

Dillwyn mentions on p. 784 of his Descriptive catalogue of recent shells, vol. 2; 1817, a *S. perspectivum*. His diagnosis approaches more that of a genus than that of a species and the description is very indefinite and vague, whilst the citations refer to several species of *Solarium*, at least to 7 species and 2 varieties.

What was the species that Lamarck had in view with the name *S. perspectivum*?

The *Solarium* of the clear drawing, which he gives under this name in his *Tableau Encyclopédique* (An VI, pl. 446, fig. 1, a, b), agrees in every respect with a typical *S. maximum* Phil., in its sculpture, viz., the place of the sulci, the breadth of the cingula and radiating striae, as well as for its pattern, and on account of its notable proportions (73 mm diam.).

The diagnosis (1822, p. 3, No 1) is very brief, but contains, besides some characters of the genus, also two passages more definitely referring to a well-defined species. The first one is the expression "longitudinaliter striata". As can be understood from his diagnosis of other *Solarium*'s, Lamarck means here "radiatim striata", a character which is very striking in *S. maximum* Phil., as it shows on all its whorls, including the ultimate, deeply impressed radiating striae. It is true that this sculpture occurs also in *S. perspectivum* auct., but here the sulci are not so conspicuous, they are shallower, becoming more and more superficial on the lower whorls and finally disappear completely on the ultimate.

The second passage in the diagnosis: "cingulis albo et fusco aut castaneo articulatis prope suturas" is applicable to *S. maximum* Phil. as well as to *S. perspectivum* auct. In *S. maximum*, however, the cingulum supra-suturale as well as the cingulum suturale are broad and conspicuous, in *S. perspectivum* on the contrary the cingula are rather narrow and the cingulum suturale is not articulated, but bordered with a brown band. The vitta infra-suturalis is the most striking in the latter. If Lamarck had described here *S. perspectivum* auct. he would have mentioned this vitta in the first place in his diagnosis, whilst he does not speak of it at all, which would be very natural in a description of *S. maximum* Phil. For dimensions Lamarck mentions: "2 pouces 7 lignes" (± 70 mm), which corresponds nearly with those of the figured specimen; these dimensions also point rather to *S. maximum* Phil. than to *S. perspectivum* auct., as the latter is generally smaller.

Judging from the above mentioned, one should perhaps suppose that from the group of *Solarium*'s, called by Linné "*Trochus perspectivus*", Lamarck had segregated *S. maximum* and that this species ought to be considered as the typical *S. perspectivum*. This is, however, not the case; it appears from the citations of Lamarck that he, just as Linné, classed a number of allied species under the name *S. perspectivum*. Possibly he was influenced by Linné's *Systema Naturae*, as of the 9 citations mentioned by Linné in the 12th edition, after his diagnosis of *Trochus perspectivus*, 7 are quoted also by Lamarck. What concerns the 7 other citations of

Lamarck, they confirm our statement, namely that the latter had no clearly defined conception of *S. perspectivum*, as they refer to figures of *S. perspectivum* as well as of *S. maximum* and of species akin to these two.

It is always difficult to identify with certainty a *Solarium* from a picture of the base only. If, moreover, as in Bowdich (1822, pl. 9, fig. 17), the figure is coarsely executed, one can but say that it may be possible that the author has tried to represent *S. perspectivum* auct.

Wood (1825, p. 137, pl. 29, fig. 62 c) shows a small but good drawing of *S. perspectivum* auct. On the figures quoted by him, however, we see at least pictured 6 different species and one variety, which gives not the impression that his conception of *S. perspectivum* is very well-defined.

It is the merit of Sowerby I that not alone he segregated a well-defined species from the group of *S. perspectivum*, but that he made it easily distinguishable by clear figures. In his *The genera of recent and fossil shells*, vol. 2; 1820—25 (probably part 38, containing *Solarium*, appeared only in 1831) he gives on plate 202, under the name *Solarium perspectivum*, two fine coloured coppers of a *Solarium*, drawn in natural size, in side-view and from the base.

These figures represent a moderately conoid shell with the last whorls slightly convex. The cingulum suturale with a narrow dark brown border on the side of the suture; the sulcus spiralis rather conspicuous, the vitta infra-suturalis is continuous and of a chestnut colour. Cingulum penultimum with brown spots, about as broad as the sulcus peripheralis, cingulum ultimum smaller and articulated with dark brown. The cingulum externum and infra-peripherale of the base spotted with chestnut. Sulcus externus very narrow. The proximal border of the area basalis media with a thin interrupted brown band. Umbilicus very large, about $\frac{3}{4}$ of the ultimate whorl, umbilical crenulations brownish. To complete this description I add a photographic reproduction of the illustration of Sowerby (fig. 2).

The differences between *S. incisum* Phil. (1848, p. 169, No 45) and *S. perspectivum* are too minute to keep the former as a species or even as a variety. The principal character which distinguishes it from *S. perspectivum* is the pale colour ("albida") of the shell. The other characters given by Philippi, as the persisting of the radiating sculpture on the last whorl and the presence of a filum in the sulcus peripheralis, can be found also in for the rest typical specimens of *S. perspectivum*. What concerns the nearly white cingulum ultimum ("cingulo infimo ultimi anfractus . . . fere albo") of *S. incisum* (which is correlate with the pale colour of this species), this cingulum is also, in otherwise dark specimens of *S. perspecti-*

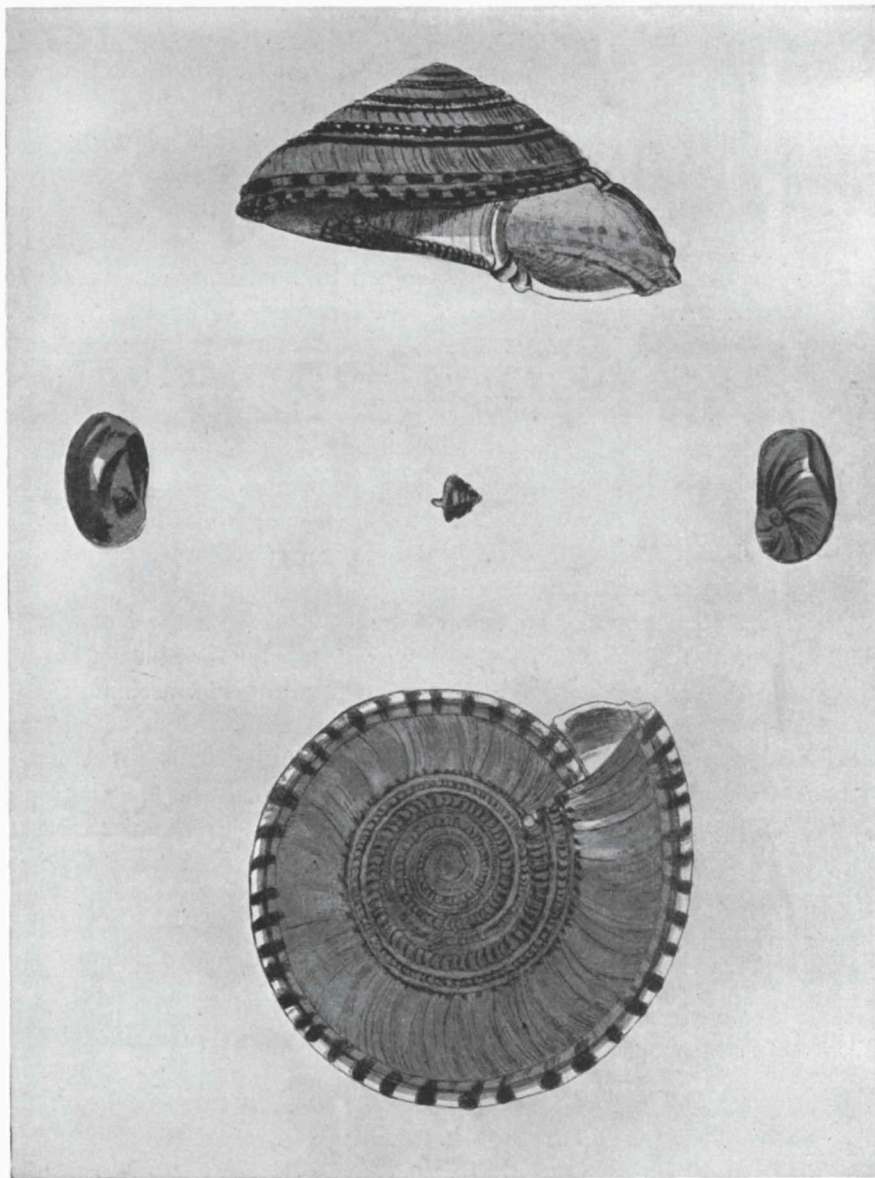


Fig. 2. *Solarium perspectivum* (L.) Sow. I. Photographic reproduction of Sowerby's plate. $\times 1$.

vum, already faintly spotted; in slightly paler ones these spots disappear of course almost completely.

Even after having separated the varieties: *australis* (Phil.), *formosa* (Hinds) and *trochlearis* (Hinds) from *S. perspectivum*, it remains still a somewhat variable species. It varies in height and in the grade of convexity of the base; in what concerns the sculpture it varies in the different development of the radial striation and of the filum in the sulcus peripheralis. There is also some variation in the ground colour and in that of the cingula. The vitta infra-suturalis is of a more or less dark colour: from darkbrown or black (fig. 3*a*; ac. Banda Is., from E. F. Jochim's collection) its colour varies to pale reddish brown in which a series of darker spots is visible (fig. 3*b*; y. P. Singkep [E. of Sumatra], F. A. van Velsen). The cingulum penultimum is often plain rufous or fuscous in the earlier whorls, becoming only white articulated with brown on the later ones. But the greatest variations in pattern are found in the cingulum suturale, where generally a brown band bordered with white is visible, both of about equal breadth. It may occur now that this white border increases more and more, at the expense of the brown vitta, and occupies finally the whole breadth of the cingulum suturale (fig. 3*c*; o. Fak-fak [N. W. New Guinea], C. L. J. Palmer van den Broek), or, on the contrary, the brown vitta may extend about till the sulcus, so that the white is scarcely visible (fig. 3*d*; ai. S. Africa, H. C. Fulton).

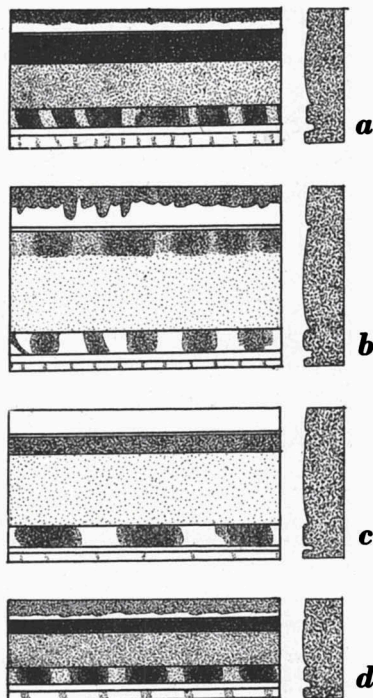


Fig. 3, a-d. *Solarium perspectivum* (L.) Sow. I, part of the ultimate whorl. Different patterns of colouring. $\times 2$.

a. 6. Indian Ocean, C. G. C. Reinwardt. — b. 1. Besoeki (E. Java), J. Semmelink. — c. 3. Banka Isl. (E. of Sumatra), J. F. R. S. van den Bossche. — d. 1. Billiton Isl. (E. of Sumatra), ? — e. 3. Amboyna, Hoedt. — f. 4. Timor, G. van Zijnen Wartel. — g. 1. Batjan Isl. (Moluccas), H. A. Bernstein. — h. 2. Misool (W. of New Guinea), ? — i. 1.

Waigeo Isl. (near New Guinea), H. A. Bernstein. — j. 5. Nossi Bé (near Madagascar), Pollen & v. Dam. — k. 3. Valparaiso and Tahiti, H. Cuming. — l. 1. Toeban, res. Rembang (Java), W. C. van Heurn. — m. 1. Nias Isl. (near Sumatra), E. E. W. G. Schröder. — n. 10. Tapa Toean, Atjeh (Sumatra), H. E. Wempe. — o. 2. Fak-fak (N. W. New Guinea), C. L. J. Palmer van den Broek. — p. 1. Painan, Res. Padang (Sumatra), from E. F. Jochim's collection. — q. 7. Madoera, from E. F. Jochim's collection. — r. 1. Tji Liwoeng (N. W. Java), P. Buitendijk. — s. 2. Kagrmaksar, Aden, H. Strengers & L. E. Nobel. — t. 3. Crater, Aden, H. Strengers & L. E. Nobel. — u. 1. Bander Tauwahi, Aden, H. Strengers & L. E. Nobel. — v. 1. Wijnkoopsbaai (S. W. Java), from Jochim's collection. — w. 1. between Bangil & Sitoebondo (E. Java), Research Officer Fisheries, Pasoeroean. — x. 1. Peusangan, Atjeh (Sumatra), G. A. J. van der Sande. — y. 1. P. Singkep (E. of Sumatra), F. A. van Velsen. — z. 1. Takisoeng near Bandjermasin (S. Borneo), Miss A. Aalders. — aa. 1. Boesak (N. Celebes), ? — ab. 1. Moluccas, J. L. Storm van 's Gravesande. — ac. 1. Banda Is., from E. F. Jochim's collection. — ad. 1. Oahu, Sandwich Is., F. P. Koumans & J. Knock. — ae. 1. Madras (Br. India), Miss C. Bayer. — af. 2. Djask (Gulf of Oman), Ottens. — ag. 1. Durban (Natal), P. Buitendijk. — ah. 1. Indian Ocean, C. G. C. Reinwardt. — ai. 1. S. Africa, H. C. Fulton. — aj. 1. Madoera, Mangold. — 1194. 1. Amboyna, E. A. Forsten.

var. **australis** (Philippi)

Solarium australe (non Mörch) Philippi, Zeitschr. f. Malakozool., vol. 5, p. 168, No 44; 1848 (1849).

Solarium australe, Philippi, Martini & Chemnitz, Syst. Conch. Cab., vol. 2, part 7, p. 29, No 32, pl. 4, fig. 8; 1853.

Solarium perspectivum Linn. Var. (*Australis*, Phil.), Hanley, Sowerby, Thesaurus Conchyl., vol. 3, p. 228; 1863 (1866).

Solarium berspectivum, Linn. Var. *Australis*, Marshall, Tryon, Manual of Conch., vol. 9, p. 8, pl. 2, figs. 20, 21; 1887.

Type locality: "Nova Zeelandia, Taiti etc."

Our specimen agrees in the form of the base and in sculpture, as well as in pattern and colour of upper side and base, completely with the var. *australis* (Phil.). It is, however, a trifle more depressed than the shell pictured by Philippi (1853, pl. 4, fig. 8) and has a quite white cingulum ultimum instead of one spotted with yellow.

The specimen in our collections, from S. Africa, marked as var. *australis* (Phil.), although corresponding with this variety in some characters, as for instance the radial striation, in other respects differs too much to

retain it under this name. It is different, among others, from the var. *australis* (Phil.) by the lack of a dark apex, in the colour of the cingulum suturale and in that the base is scarcely convex. It is also larger, namely 30.5 mm, where Philippi mentions 9”.

a. 1. Paranaque, Luzon (Philippines), F. P. Koumans.

var. **formosa** (Hinds)

Trochus perspectivus seu opticus Chemnitz (pars), Syst. Conch. Cab., vol. 5, p. 121, pl. 172, fig. 1693 (tantum); 1781.

Solarium formosum Hinds, Proc. Zool. Soc. London, p. 22, No 1; 1844.

Solarium zonatum Philippi, Zeitschr. f. Malakozool., vol. 5, p. 173, No 54; 1848 (1849).

Solarium zonatum, Mörch, Catal. conch. Yoldi, Cephalophora, p. 47; 1852.

Solarium formosum, Philippi, Martini & Chemnitz, Syst. Conch. Cab., vol. 2, part 7, p. 28, No 31 & p. 9, pl. 4, fig. 7 & pl. 2, fig. 3; 1853.

Solarium perspectivum, Reeve, Conch. Icon., Solarium, sp. 11, pl. 2, fig. 11a (non 11b); 1864.

Type locality: “Amboina”.

The shell named *S. formosum* Hinds is an elevated form of *S. perspectivum* and the differences with the latter, quoted by the author, are too small to consider it as a different species. As differences, between *S. formosum* and *S. perspectivum*, Hinds mentions that the angle formed by the spire is smaller in the former, or as this author expresses it: “in shape it is considerably more elevated and conical” and further, in relation to the umbilicus, he states that it is “moderately dilated, being less so than in *S. perspectivum*”. The diameter of the umbilicus is, however, correlate with the smaller vertical angle, for, as the whorls in this variety retain their normal diameter, the umbilicus in consequence must be smaller. As one finds all degrees of transition between *S. formosum* and *S. perspectivum* with its more depressed spire and as, moreover, they coincide totally in sculpture and pattern, it is best, if one does not want to follow Reeve’s, Marshall’s, Paetel’s or Dautzenberg’s example, and place *S. formosum* among the synonyms of *S. perspectivum*, to consider it as a variety of this shell.

a. 1. Moluccas, J. L. Storm van ’s Gravesande. — b. 2. Indian Ocean, ? — c. 1. Bay of Batavia (Java), from E. F. Jochim’s collection. — d. 2. Tapa Toean, Atjeh (Sumatra), H. E. Wempe. — e. 1. Banda Is., from E. F. Jochim’s collection. — f. 1. Timor, Zijnen Wartel. — g. 2. ?, ?.

var. **heurni** nov. var. (fig. 4 a, b, c)

S. testa depresso conoidea, radiatim plico-striata, etiam in basi; sutura canaliculata; anfractibus superne sulco unico divisis; carina valde depressa

prominente; cingulo suturali fere omnino lacteo; vitta infra-suturali spadicea, plus quam dimidium latitudinis inter sulcum spiralem et cingulum penultimum implente; area media lactea; cingulo penultimo albido, pallide spadiceo maculato, latitudine sulcum unifilum aequante; carina basique fere totis albis; umbilico patulo crenis albis satis magnis cincto. Diam. 27 mm; alt. 12.5 mm.

The specimen is in an excellent condition, having all its lustre.

Habitus. — This *Solarium* numbering 8 whorls, has the general shape of *S. perspectivum* (L.), but showing a rather strongly developed radiating

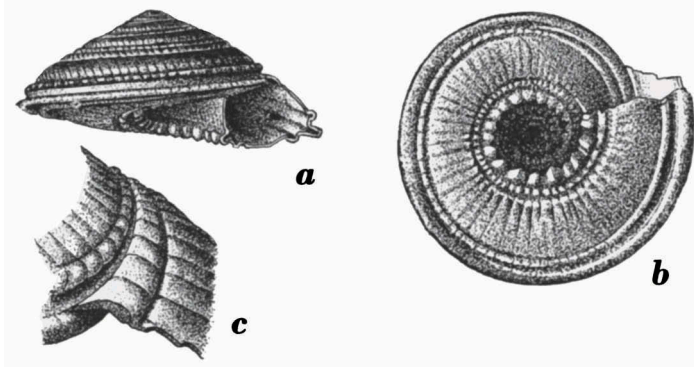


Fig. 4, a-c. *Solarium perspectivum* (L.) Sow. I var. *heurni* nov. var.
a, b, $\times 1\frac{1}{2}$; c, $\times 4$.

sculpture and a prominent cingulum ultimum. Through its canaliculate suture it resembles *S. maximum* Phil. Just as in the latter, this suture has arisen on account of the border of the cingulum suturale being applied on the upper side of the cingulum ultimum of the preceding whorl. The sulcus peripheralis therefore remains partly uncovered and forms, with the in this specimen rounded cingulum suturale, the deep canaliculate suture. In *S. perspectivum* s.s., on the contrary, the cingulum suturale is applied more or less on the superior side of the sulcus peripheralis, so that this groove is almost completely covered and the cingulum suturale approaches close to the cingulum supra-suturale.

Sculpture. — Discus superior.

Cingula. — Cingulum suturale rather elevated, with a rounded profile (in *S. perspectivum* the profile is flattened). Cingulum penultimum elevated and rounded, as large as the sulcus peripheralis. Cingulum ultimum strongly flattened in a baso-apical direction and prominent, with obsolete radial cuts.

Sulci. — Sulcus spiralis deep and well developed, more deeply incised

than in *S. perspectivum*. Sulcus tertius indicated by an obtuse angle in the profile of the whorl. Sulcus peripheralis deep, with a filum.

Sculpture. — Discus inferior.

The base with radiating rays, these striae increase in the direction of the umbilicus, so as to form obsolete folds in the area basalis media, through which the border, near the sulcus medius, is slightly notched. These folds continue on the bottom of the sulcus medius making it rugged and form the strongly developed granules of the cingulum proxumbilicale. The crenae umbilici are a little larger than in specimens of *S. perspectivum* of the same size.

Colour. — Discus superior.

Cingulum suturale lacteous with a faint indication of castaneous along the suture. The vitta infra-suturalis (cingulum secundum) occupies more than half the distance between the sulcus spiralis and the cingulum penultimum and is of a spadiceous colour, which becomes paler and paler in the direction from the suture to the base. Area media (cingulum tertium) lacteous. Cingulum penultimum lacteous, with light spadiceous dots. Cingulum ultimum white.

Colour. — Discus inferior.

Totally white, with pale spadiceous spots placed at regular distances on the cingulum infra-peripherale. Here and there with obscure spadiceous dots on the proximal border of the area basalis media and on the crenae umbilici.

This variety reminds vaguely of the forma *incisa* (Phil.), but is easily distinguishable by the more conspicuous radiating striae, by the form of the cingulum ultimum and by the canaliculate suture. It differs, moreover, by its colouring.

I named this variety after Jhr. W. C. van Heurn, the enthusiastic collector, who quite desinterestedly has given during more than thirty years to our Museum the fine collections of molluscs, gathered by him in different countries of the world, but principally in the Indian Archipelago.

a. 1. Laboehan Deli (E. Sumatra), L. de Priester (holotype var.).

var. **trochlearis** (Hinds) (fig. 5 a)

Solarium perspectivum, Kiener (pars), Icon. coq. viv., Solarium, pl. 1, fig. 1; 1838—1839.

Solarium trochleare Hinds, Proc. Zool. Soc. London, p. 25, No 13; 1844.

Solarium perspectivum (non auct.) Philippi, Zeitschr. f. Malakozool., vol. 5, p. 170, No 49; 1848 (1849).

Solarium trochleare, Philippi, Martini & Chemnitz, Syst. Conch. Cab., vol. 2, part 7, p. 3, No 1, pl. 1, fig. 1; 1853.

Solarium (Architectonica) trochleare, Hanley, Sowerby, Thesaurus Conchyl., vol. 3, p. 228, pl. 2, figs. 19, 20; 1863 (1866).

Solarium trochleare, Reeve, Conch. Icon., Solarium, sp. 10, pl. 2, fig. 10; 1864.

Solarium trochleare, Hidalgo, Catalogo mol. test. Filipinas, p. 188; 1904—1905.

Type locality: "Indian Seas".

It is Hinds who has separated this *Solarium* from *S. perspectivum* (L.), though later authors, e.g., Marshall (1887, p. 8), Paetel (1887, p. 287),

Dautzenberg (1906, p. 167), have united it again with *S. perspectivum*.

Although Kiener, in his description of *S. perspectivum* unites various totally different species, which appears, amongst others, from his quotation: "les tours inférieurs... sont traversés comme les premiers (les tours supérieurs) par deux à quatre¹⁾ sillons transverses plus ou moins creusés et distants", it seems that it was still *S. trochleare* Hinds which he had especially in view. His figure on plate 1 in any way is a *S. trochleare*, though not quite a typical specimen, as the cingulum suturale is not "atro-fuscus", as Hinds mentions it for this species.

Philippi considers *S. trochleare* Hinds as Linné's *S. perspectivum*. It is not clear to me on what motives he has founded his opinion, as only Linné's citation of Seba (1761, pl. 40, figs. 1, 2), in the 12th edition of the *Systema naturae*, points to a *Solarium* resembling *S. trochleare*. The illustration, given by Philippi of this species, does not agree wholly with his description. He writes namely: "der oberste Gürtel zwischen der Naht und der darauf folgenden Furche ist einfarbig rothbraun, mit einem schmalen weissen Saum", as is indeed the pattern of the true *S. trochleare* Hinds, on Philippi's figure, however, the superior part of the cingulum suturale is brown, but

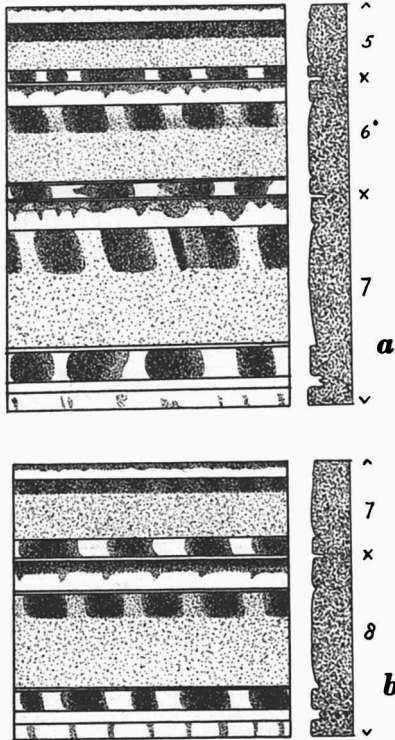


Fig. 5. a. *Solarium perspectivum* (L.) Sow. I var. *trochlearis* (Hinds), part of the 3 last whorls. $\times 2$. b. *Solarium perspectivum* (L.) Sow. I, part of the penultimate and ultimate whorls. Transition to the var. *trochlearis* (Hinds). $\times 2$.

folgenden Furche ist einfarbig rothbraun, mit einem schmalen weissen Saum", as is indeed the pattern of the true *S. trochleare* Hinds, on Philippi's figure, however, the superior part of the cingulum suturale is brown, but

1) spacing by me.

its border on the side of the sulcus spiralis is of the same tint as the ground colour of the shell, namely pale brown, instead of white.

The principal difference between *S. trochleare* and *S. perspectivum* resides in the vitta infra-suturalis which in the latter is of a plain brown colour, whilst the former bears a series of square brown spots. On the earlier whorls these spots melt together and form a continuous band, as Hinds mentions it ("towards the spire usually become continuous"). On the higher whorls this band first is composed of a series of dark brown spots on a light-brown ground, then still more towards the apex this vitta becomes wholly of a brown colour. In some specimens this band will dissolve itself very soon in spots, whereas in others this occurs on the body whorl only; we have then a transition from *S. trochleare* to those specimens of *S. perspectivum*, which have their vitta infra-suturalis not of a plain brown colour, but composed of a series of dark quadratic spots on a brown ground (fig. 5 *b*; ah. Indian Ocean, C. G. C. Reinwardt).

The other characters given by Hinds for *S. trochleare* can also occur in *S. perspectivum*. Instead, however, of placing the former under the synonyms of *S. perspectivum* it seems preferable to me, on account of its different pattern, to consider it as a variety of *S. perspectivum*.

a. 1. Madoera, from E. F. Jochim's collection. — b. 1. Indian Ocean, C. G. C. Reinwardt. — c. 2. Drysdale Isl., Sandy beach (N. Australia), F. P. Koumans & J. Knock. — d. 1. Elck Isl., Sandy beach (N. Australia), F. P. Koumans & J. Knock.

var. *ex colore*

This shell has 7 whorls, the first ones with the normal coloration of *S. perspectivum* (L.). After the fifth whorl the area media grows darker and darker, till it has the same colour as the vitta infra-suturalis and can no longer be distinguished from it, the two vittae are fused together in one broad band of a castaneous colour with here and there paler flames. In the lighter parts the vitta infra-suturalis has completely disappeared too. The cingulum suturale, which originally was entirely white, instead of having a brown margin at the side of the suture, acquires on about the half of the ultimate whorl also a brownish colour.

Diameter 22.5 mm; height 10 mm.

As we possess only one specimen with this pattern and as it is not certain if it is either an aberratio or a variety, I confine myself to give only a description of this specimen.

a. 1. Menado (Celebes), from E. F. Jochim's collection.

S. pictum Philippi

- Solarium fragile* Hinds, Proc. Zool. Soc. London, p. 24, No 8; 1844. (f. Hanley).
Solarium fragile, Hinds, Zool. Voyage Sulphur, p. 51, pl. 14, figs. 15, 16; 1844. (f. Hanley).
Solarium pictum Philippi, Zeitschr. f. Malakozool., vol. 5, p. 171, No 51; 1848 (1849).
Solarium pictum, Philippi, Martini & Chemnitz, Syst. Conch. Cab., vol. 2, part 7, p. 15, No 12 & p. 10, pl. 3, fig. 2 & pl. 2, fig. 4; 1853.
Solarium (Architectonica) pictum, Hanley, Sowerby, Thesaurus Conchyl., vol. 3, p. 231, pl. 3, figs. 33, 34; 1863 (1866).
Solarium pictum, Reeve, Conch. Icon., Solarium, sp. 2, pl. 1, fig. 2; 1864.
Solarium pictum, Marshall, Tryon, Manual of Conch., vol. 9, p. 10, pl. 3, figs. 35, 36; 1887.
Solarium pictum, Paetel, Cat. Conch. Samml., vol. 1, p. 287; 1887.
Solarium pictum, Hidalgo, Catalogo mol. test. Filipinas, p. 188; 1904—1905.

Type locality: ?; "New Guinea" (Tryon).

In connexion with the subsequent statement of Hanley I place *S. fragile* Hinds among the synonyms of *S. pictum* Phil. The former writes namely (1863, p. 232): "The acquisition, by Mr. Taylor, of all the original specimens of *Solaria*, described by Hinds, ... has enabled me to identify, by a long chain of connecting links, the immature *fragilis* of that naturalist with the adult *pictum* of Philippi". Paetel (1887, p. 286) holds another view and considers *S. fragile* Hinds as a synonym of *S. maximum* Phil. If the opinion of Hanley is correct, this *Solarium* ought to be named *S. fragile* Hinds.

- a. 4. Indian Ocean, from Dalen's collection. — b. 1. Banka Isl. (E. of Sumatra), J. F. R. S. van den Bossche. — c. 1. Badjowe (S. Celebes), Moens. — d. 1. Madoera, Mangold. — e. 1. Tapa Toean, Atjeh (Sumatra), H. E. Wempe. — f. 2. Between Bangil and Sitoebondo (E. Java), Research Officer Fisheries, Pasoeroean. — g. 2. Painan, Res. Padang (Sumatra), from E. F. Jochim's collection. — h. 1. Boesak (N. Celebes), ?

S. placentale Hinds

- Solarium placentale* Hinds, Proc. Zool. Soc. London, p. 22, No 2; 1844.
Solarium placentale, Hinds, Zool. Voyage Sulphur, vol. 2, p. 50, pl. 14, figs. 5, 6; 1844.
Solarium placentale, Philippi, Martini & Chemnitz, Syst. Conch. Cab., vol. 2, part 7, p. 18, No 16, pl. 3, fig. 6; 1853.
Solarium (Architectonica) placentula, Hanley, Sowerby, Thesaurus Conchyl., vol. 3, p. 235, pl. 3, figs. 23, 24; 1863 (1866).
Solarium placentula, Reeve, Conch. Icon., Solarium, sp. 13, pl. 3, fig. 13; 1864.
Solarium placentula, Marshall, Tryon, Manual of Conch., vol. 9, p. 13, pl. 4, figs. 51, 52; 1887.
Solarium placentulum, Paetel, Catal. Conch. Samml., vol. 1, p. 287; 1887.
Solarium peracutum Dall, Bull. Mus. Comp. Zool. Harvard Coll. Cambridge, vol. 18, p. 275, pl. 33, figs. 2, 5; 1889.

Solarium peracutum, Dall, Bull. U.S. Nat. Mus., No 37, p. 148, pl. 33, figs. 2, 5; 1889.
Solarium placentale, Hinds, var., Smith, Proc. Zool. Soc. London, p. 281; 1890.

Type locality: "Bay of Magdalena, California".

S. purpuratum Hinds

- Solarium purpuratum* Hinds, Proc. Zool. Soc. London, p. 25, No 14; 1844.
Solarium purpuratum, Hinds, Zool. Voyage Sulphur, vol. 2, p. 49, pl. 14, figs. 1, 2; 1844.
Solarium stellatum Philippi, Zeitschr. f. Malakozool., vol. 5, p. 172, No 52; 1848 (1849). (f. Reeve).
Solarium purpuratum, Philippi, Martini & Chemnitz, Syst. Conch. Cab., vol. 2, part 7, p. 8, No 4, pl. 1, figs. 6, 7; 1853.
Solarium stellatum, Philippi, Martini & Chemnitz, Syst. Conch. Cab., vol. 2, part 7, p. 16, No 13, pl. 3, fig. 3; 1853.
Solarium (Architectonica) purpuratum, Hanley, Sowerby, Thesaurus Conchyl., vol. 3, p. 232, pl. 1, figs. 7, 8; 1863 (1866).
Solarium purpuratum, Reeve, Conch. Icon., Solarium, sp. 5, pl. 1, fig. 5; 1864.
Solarium purpuratum, Marshall, Tryon, Manual of Conch., vol. 9, p. 11, pl. 4, figs. 41, 42; 1887.
Solarium purpuratum, Paetel, Cat. Conch. Samml., vol. 1, p. 287; 1887.

Type locality: ?; "Moluccas" (Tryon).

This *Solarium* is nearest related to *S. pictum* Phil., from which it differs, among other things, in that the two superior cingula are painted with "maculis rufo-fuscis subgeminis", the spots of the one cingulum being placed rather regularly above those of the other. In *S. pictum* the spots are scattered without any order over both these cingula; the pattern, moreover, of the base of the two species is quite different. The crenae of the umbilicus are not white, as is stated by Hinds in his diagnosis, but pale fuscous, this becomes evident through the figure of this author and is, moreover, confirmed by our specimens.

a. 2. China Sea, H. C. Fulton. — b. 2. Madras (Br. India), Miss C. Bayer.

S. quadriceps Hinds

- Solarium quadriceps* Hinds, Proc. Zool. Soc. London, p. 23, No 4; 1844.
Solarium quadriceps, Hinds, Zool. Voyage Sulphur, vol. 2, p. 50, pl. 14, figs. 7, 8; 1844.
Solarium quadriceps, Philippi, Martini & Chemnitz, Syst. Conch. Cab., vol. 2, part 7, p. 7, No 3, pl. 1, figs. 4, 5; 1853.
Solarium granulatum (non Lamarck) Philippi (syn. plur. exclus.), Martini & Chemnitz, Syst. Conch. Cab., vol. 2, part 7, p. 17, No 15, pl. 3, fig. 5; 1853.
 (?) *Architectonica Valenciennesii* Mörch, Malakoz. Bl., vol. 6, p. 122; 1859.
Solarium (Architectonica) quadriceps, Hanley, Sowerby, Thesaurus Conchyl., vol. 3, p. 229, pl. 1, figs. 3, 4; 1863 (1866).
Solarium quadriceps, Reeve, Conch. Icon., Solarium, sp. 18, pl. 3, figs. 18a, 18b; 1864.
Solarium quadriceps, Marshall, Tryon, Manual of Conch., vol. 9, p. 10; 1887.
Solarium quadriceps, Paetel, Cat. Conch. Samml., vol. 1, p. 287; 1887.

Type locality: "Bay of Panama".

Hinds has described and figured a juvenile specimen of this *Solarium*, this is apparent also from the diameter: 14 lin., where adult shells attain more than 5 cm. The older specimens make the impression of being smoother than the young ones, as the granose warts on the lower whorls disappear more and more.

Under the name "*Solarium granulatum*, Lam." and with the original diagnosis of Lamarck and an erroneous citation: "List., Conch., t. 67, fig. 27", Kiener (1838—1839, p. 4, No 2, pl. 2, fig. 2) gives a picture of a shell which surely is not the species of Lamarck. The description of Kiener is so vague that one cannot decide whether he had in view *S. granulatum* Lm. (= *S. nobile* Roed.) or *S. granulatum* Phil. (= *S. quadriceps* Hinds).

Fascinated by this illustration,—which appeared 16 years after the description of *S. granulatum* by Lamarck and his references to clear pictures of this species,—Philippi (as I observed already on p. 230) was in the belief that this figure of Kiener was really *S. granulatum* Lm. It is true that he expressed his surprise in relation to the discordance between the text of Lamarck and this drawing of Kiener, but he did not see that he was on the wrong track. He states, after his diagnosis of *S. verrucosum* (1848, p. 173), among other things: "*S. granulatum* Lamk. (ex Kieneri figura) umbilico anfractum ultimum superante!! (quod vero cum verbis Lamarckii: 'umbilico coarctato' non quadrat) satis superque differt, neque cingula duo granulata nostri (namely *S. verrucosum* Phil. = *S. granulatum* Lm.) in basi habet". As appears from another description of Philippi (1853, p. 10, No 6) this author means by "cingula duo", the two cingula "ausser der gewöhnlichen gekörnten Leiste" which surround the umbilicus of *S. granulatum* Phil. I class this *S. granulatum* (non Lm.) Phil. as a synonym of *S. quadriceps* Hinds, as Hanley also did in the Thesaurus.

S. quadriceps Hinds differs from *S. nobile* (Roed.), amongst others, in the following characters. The cingulum infra-suturale and tertium are immaculate in the former, whereas in the latter they generally are spotted with chestnut-red, just as the other cingula. Although *S. quadriceps* has the 5 cingula of the ultimate whorl of about equal breadth, the cingulum ultimum and penultimum are still more conspicuous, also because both, — in contradistinction with the two cingula situated above,—are maculated with brown. In *S. nobile*, no difference is visible between the cingulum penultimum and the two cingula placed more upwards, whereas the cingulum ultimum is but a little more conspicuous. The area basalis media in *S. quadriceps* has radiating folds, in *S. nobile* it has 3 granose cingula. In *S. quadriceps* the umbilicus is larger than in *S. nobile* and with reddish brown crenations, these being white in *S. nobile*.

S. quadriceps differs, amongst others, from *S. maximum* Phil. through the sulcus secundus, which is situated in the midst between the sulcus primus and tertius, whereas in *S. maximum* it is placed, on all the whorls, nearer to the sulcus primus. The locality of *S. quadriceps* is Panama, whereas *S. maximum* inhabits the Indian Ocean.

S. reevei Hanley

Solarium reevei Hanley, Proc. Zool. Soc. London, p. 204; 1862.

Solarium (Architectonica) Reevei, Hanley, Sowerby, Thesaurus Conchyl., vol. 3, p. 234, pl. 1, figs. 9, 10; 1863 (1866).

Solarium Reevei, Reeve, Conch. Icon., Solarium, sp. 20, pl. 3, fig. 20; 1864.

Architectonica reevei, Angas, Proc. Zool. Soc. London, p. 201; 1867.

Solarium (Architectonica) reevei, Watson, Rep. voy. „Challenger”, Zool., vol. 15, Gasteropoda, p. 136; 1886.

Solarium Reevei, Marshall, Tryon, Manual of Conch., vol. 9, p. 12, pl. 4, figs. 45, 46; 1887.

Solarium Reevei, Paetel, Catal. Conch. Samml., vol. 1, p. 287; 1887.

Architectonica reevei, Hedley, Journ. Roy. Soc. New S. Wales, vol. 51, suppl., p. 102; (1917) 1918.

Architectonica reevei, Tomlin, Annals S. African Mus., vol. 25, p. 333; 1928.

Architectonica offlexa Iredale, Rec. Austral. Mus. Sydney, vol. 18, p. 229, pl. 25, figs. 15, 16; 1931.

Type locality: ?; “Sydney” (Reeve).

At the best *S. offlexa* is but a variety, a trifle more depressed than the typical *S. reevei*. For the rest the figures of *S. offlexa* agree completely with *S. reevei*, also in the presence of two cingula supra-suturalia (rather a cingulum supra-suturale and a cingulum ultimum).

Hanley, in the description of his *S. reevei*, points to the presence of these two cingula, which peculiarity, just as the conoidal shape, is due to the way in which this shell coils. This author writes namely (1862, p. 205): “I think both the conoidal shape and the lower suprasutural belt result from the coiling of the seven whorls upon the carinal belt instead of, as usual, upon the groove above it”. A similar wise of coiling occurs, as far as is known to me, normally in no other *Solarium*. The expression of Hanley (1862, p. 205) “the only specimen known to me”, shows that he knew only a single specimen, namely, as appears from the text, that from “Mus. Reeve”. On account of the peculiar manner of its coiling he supposed that he had to do with an abnormality, but this is, however, not the case as to day a great number of specimens is known, concurring completely in all characters with the specimen of Hanley, also in shape and in the manner of coiling.

Both our specimens, as well as those from the Museum at Brussels, correspond completely with the description and figure of Hanley, and their manner of coiling gives the impression of being quite normal.

a. 2. Port Jackson, New S. Wales (Australia), H. C. Fulton.

S. regium Hanley

Solarium regium Hanley, Proc. Zool. Soc. London, p. 205; 1862.

Solarium regium, Reeve, Conch. Icon., Solarium, sp. 16, pl. 3, fig. 16; 1864.

Solarium regium, Marshall, Tryon, Manual of Conch., vol. 9, p. 11, pl. 2, fig. 30; 1887.

Solarium regium, Paetel, Cat. Conch. Samml., vol. 1, p. 287; 1887.

Type locality: ?; ? (Reeve); ? (Tryon); ? (Paetel).

S. taylori Hanley

Solarium taylori Hanley, Proc. Zool. Soc. London, p. 205; 1862.

Solarium Taylori, Hanley, Sowerby, Thesaurus Conchyl., vol. 3, p. 230, pl. 3, figs. 31, 32; 1863 (1866).

Solarium maximum, Marshall (pars altera), Tryon, Manual of Conch., vol. 9, pl. 3, figs. 33, 34 (non 31, 32); 1887.

Solarium Taylori, Paetel, Cat. Conch. Samml., vol. 1, p. 287; 1887.

Type locality: ?; "Java" (Paetel).

I cannot decide to consider this species as a synonym of *S. maximum* Phil., as did Reeve and Marshall. *S. taylori* differs principally from *S. maximum* by the different pattern of the cingulum infra-suturale, which in the latter is "immaculato cum testa concolore" and in the former "fusco-rufescente articulatum picta". Moreover it differs by the umbilicus which is "latus" in *S. maximum* and "subangustus" in *S. taylori*; the crenae are small and "albidae" in *S. maximum*, whereas they are rather large in *S. taylori* and "carneo-rufescentes".

a. 1. ?, from Dalen's collection.

S. tryoni Marshall

Solarium Tryoni Marshall, Tryon, Manual of Conch., vol. 9, p. 10, pl. 2, figs. 28, 29; 1887.

Solarium Tryoni, Paetel, Cat. Conch. Samml., vol. 1, p. 287; 1887.

Type locality: "?Moluccas".

S. wroblewskyi (Mörch)

Architectonica Wroblewskyi Mörch, Malakozool. Bl., vol. 22, p. 154; 1875.

Solarium Wroblewskyi, Paetel, Cat. Conch. Samml., vol. 1, p. 287; 1887.

Type locality: "St. Thomas".

Mörch's diagnosis of this *Solarium* is so concise, that it is impossible to determine, even approximatively, what species he has in view. It runs like follows: "T. inferne plana, periomphalo 16—18 dentato; spira rudis". A figure or citations, to elucidate this indication, are absent, but under one of the varieties of this species Mörch quotes: "var. β . major. Geve fig. 266 (an spm. maximum)". If I understand this passage the figure of Geve represents a large form of *S. wroblewskyi*. This indication, however, does

not settle the question, as Dillwyn, Deshayes, Philippi and Hanley each cite this drawing for a different species. Dillwyn mentions this illustration of Geve among the citations of his "*S. perspectivum* Linné" and Hanley for *S. maximum* Phil., a species of the Indian Ocean; whereas this fig. 266 is quoted by Philippi for his *S. granulatum* (= *S. quadriceps* Hinds), a species of the West coast of tropical America (Panama) and by Deshayes for *S. granulatum* (non Phil.) Lm. (= *S. nobile* Roed.).

S. wroblewskyi is from St. Thomas. In relation to the small number of crenae around the umbilicus, the "spira rudis" and the locality, one may suppose *S. wroblewskyi* to be a variety of *S. granulatum* Lm.

Solarium species, aberratio

The *Solarium*, the description of which follows here, impresses itself rather as an aberratio than as a normally formed specimen. The difference in sculpture and pattern, namely between the 6 first and the two and a half last whorls, is too great and also too abrupt to consider it as a normal growth. It is for this reason that, although the specimen differs from all up to the present known species, I give only a description without indicating it by a new name.

Habitus. — The general form reminds of *S. cumingii* Hanl., also by the closely placed radiating striae, but it differs by the rounded carina. Number of whorls: $8\frac{1}{2}$.

Discus superior. — The 6 topmost whorls resemble those of *S. perspectivum*, but differ in coloration. Each whorl shows in the direction from the apex to the base: a greyish cingulum suturale, a sulcus spiralis, a fulvous vitta infra-suturalis, a griseous area media, a pale fulvous cingulum supra-suturale with obscure spots of a darker colour.

After a mark (varix) of a former outer-lip, the sculpture and pattern of the $2\frac{1}{2}$ succeeding whorls changes. The cingulum supra-suturale (cingulum quartum) disappears, or rather becomes so narrow that only a filum is left, which for the most part is covered by the next whorl. The cingulum suturale gradually acquires a pale fulvous border along the suture. The sulcus spiralis retains its normal development. The vitta infra-suturalis extends more and more downwards and after a half whorl forms flames in the direction of the base. On the ultimate whorl this vitta splits up in a series of fulvous-chestnut streaks, placed on regular distances from one another, nearly as in *S. cumingii*. The carina is rounded and is formed by 4—5 narrow cingula, or rather fila, across which the streaks continue, after having been interrupted above these cingula over a distance of about 1 mm by a white vitta.

Base.—The cingulum infra-peripherale is very narrow, here end the

fulvous-chestnut streaks. The area media is of a greyish colour and has on the proximal side, along the sulcus medius, a series of fulvous quadratic spots. The sulci on both sides of the cingulum proxumbilicale are very narrow, a good deal narrower than in *S. perspectivum*, especially the sulcus internus. Crenae umbilici smaller and more numerous than in *S. perspectivum* (in this specimen are 36 crenae, in one of the same dimensions of *S. perspectivum* 26) and of a fulvous colour.

Diameter: 37.25 mm; height: 20.50 mm.

a. 1. ? Madoera, Mangold.

SPECIES INCERTAE SEDIS

S. acutecarinatum Thiele

Solarium (?) *acutecarinatum* Thiele, Wiss. Ergebn. „Valdivia”, vol. 17, Gastropoda der Tiefsee-Exp., II, p. 80 (114), pl. 9 (21), figs. 1, 1a; (1918) 1925.

Type locality: “Station 243 (6° 39,1' südl. Br., 39° 30,8' östl. L., bei Daressalam).”

This species was proposed for a young specimen, with a diameter of merely 3.3 mm and possessing—the nepionic whorls excepted—only 1½ whorls.

S. acutissimum Sowerby III

Solarium acutissimum Sowerby III, Ann. & Mag. of Nat. Hist., vol. 14, ser. 8, p. 36, pl. 2, fig. 9; 1914.

Type locality: “Kii, Japan”.

Only the base is represented, the figure is moderate. Sowerby adds to his diagnosis: “the operculum is unknown, . . . it may possibly rank as the type of a new subgenus”.

S. calcar Costa

Solarium calcar Costa, Microdoride Mediterranea, vol. 1, p. 58, pl. 9, figs. 5 a, b, c; 1861.

Type locality: “fondi coralligeni dell’Affrica” (viz. N. Africa).

Costa describes a juvenile specimen of a diameter of 2 mm, numbering 4 whorls and provided at the periphery with a carina bearing spiniform, hollow projections. The author is undecided as to the genus in which this species should be placed and classifies it ultimately in the genus *Solarium*, observing: “ricordiamo dunque . . . che la natura non à confini prescritti, e lasciamo il giudizio ad altrui”. In my opinion it is dubious that it should belong to this genus.

S. supraradiatum Martens

Solarium supraradiatum Martens, Wiss. Ergebn. „Valdivia”, vol. 7, Gastropoda der Tiefsee-Exp., p. 118, pl. 4, fig. 16; 1903.

Type locality: “Indischer Ocean, Station 211, bei den Nikobaren, 7° 48' N.Br., 93° 7' O.L.”.

This very juvenile specimen has only a diameter of 6½ mm. “Die geringe Anzahl der Windungen legt nahe”, writes v. Martens, “dass das einzige vorliegende Exemplar noch recht jung und der Jugendzustand einer schon bekannten Art sei; in dieser Hinsicht könnte ich nur an *S. verrucosum* Phil. denken, das aber amerikanisch sein soll, und an dem ich auch auf den obersten Windungen keine derartigen Bogenfalten finde”.

S. tricarinata (Stearns)

Architectonica tricarinata Stearns, Proc. Boston Soc. of Nat. Hist., vol. 15, p. 23; 1872.

Type locality: “Long Key and shores of mainland, Tampa Bay, west coast of Florida”.

This species, which Dall does not mention in his Preliminary catalogue of the shell-bearing marine mollusks . . . of the Southeastern coast of the United States; 1889, was collected on the West coast of Florida. Stearns gives no figure and from his incomplete description one cannot decide if it is really a *Solarium*. The part of his diagnosis: “angulated, with three equidistant, prominent, revolving ribs on the periphery of the basal volution and two on the whorl above”, makes the impression that one has to do with a *Philippia*, whereas the words: “aperture round, peritreme much thickened”, remind us more of a *Torinia*.

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