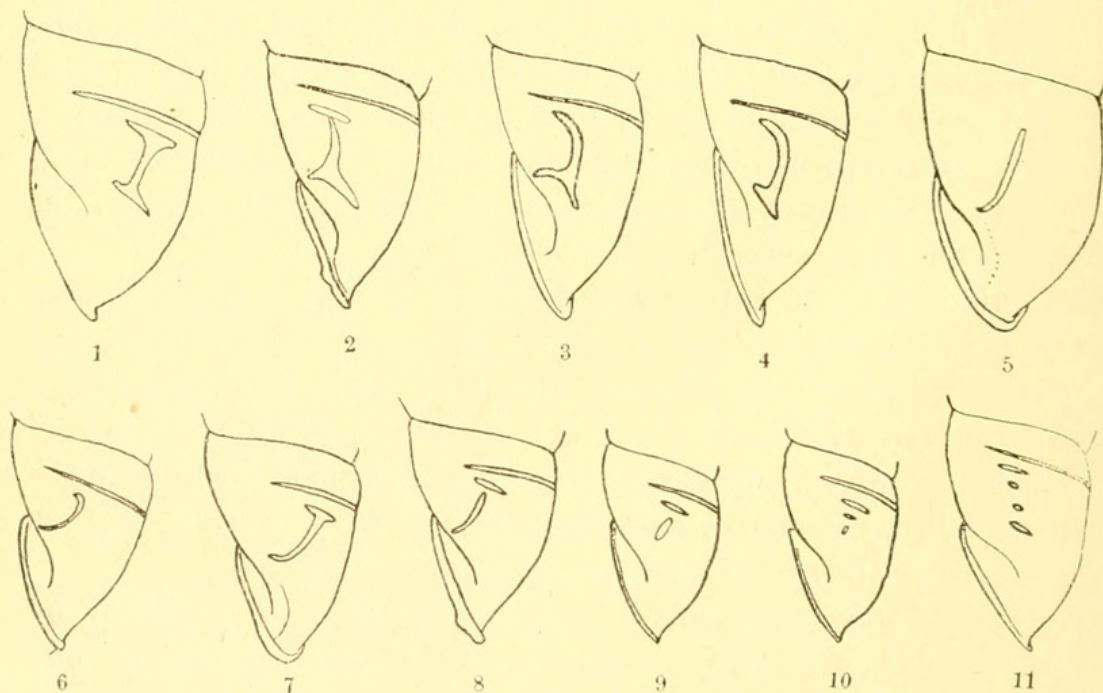


## ADDITIONS TO THE JAPANESE LAND SNAIL FAUNA.—V.

BY HENRY A. PILSBRY.

The description of Japanese *Clausiliidæ* is resumed in the present paper. Enough material is now at hand to permit some work looking beyond merely descriptive treatment, while every sending from Mr. Hirase adds to the data on one or another of the problems presented by these intricately constructed creatures. I have below considered the evolution of the "lunella," as shown in some newly discovered species of *Stereophædusa*, in which young shells show a series of distinct palatal folds, like the European tertiary *Clausiliidæ* and the more primitive forms of Eastern Asia, while old shells have a true lunella. A similar transformation has likewise been observed in a *Megalophædusa* just received. The evidence indicates that the lunella has been independently acquired, in different phyla, by a process of parallel evolution.



Diagrams showing chief modifications of the palatal armature in *Hemiphaedusa*: Fig. 1, *C. aulacophora*; fig. 2, *C. crenilabium*; fig. 3, *C. attrita*; fig. 4, *C. hakonensis*; fig. 5, *C. hyperolia*; fig. 6, *C. shikokuensis*; fig. 7, *C. perignobilis*; fig. 8, *C. munus*; fig. 9, *C. micropeas*; fig. 11, *C. gracilispira*.



I must again express my deep obligation for material to Mr. Y. Hirase, of Kyoto, Japan. His tireless researches, critical eye for detecting species, and exactness in recording localities are worthy of high commendation. Without these qualities the new and relatively exact literature of Japanese land mollusks would not exist.

Section HEMIPHÆDUSA Boettger.

The system of groups set forth by Dr. Boettger in the *Clausilienstudien*, while sufficient at that time, is quite inadequate for the classification of the great number of Chinese and Japanese species now known. For Japanese species my studies lead me to adopt the arrangement offered below. The clausilium in all the groups is rounded or tapering at the end, and not thickened or only slightly so.

- a.—Inferior lamella spirally ascending within, visible in a front view, receding less deeply than in other *Hemiphædusæ*; shell rather large; superior lamella continuous with the spiral.
- b.—Interlamellar space corrugated; lunella united to the middle of a lower palatal plica, contiguous to or united with an upper palatal plica near the middle (fig. 2). Clausilium tapering below, recurved and spoutlike at the apex, . . . . . Group of *C. pychochila*.
- b<sup>1</sup>.—Interlamellar space smooth; lunella curving inward above, united below to the middle of the lower palatal plica (figs. 3, 4). Clausilium narrowly tongue-shaped, . . . . . Group of *C. platyauchen*.
- a<sup>1</sup>.—Inferior lamella receding, inconspicuous or not visible in a front view.
- b.—Several palatal plicæ; no lunella (fig. 11), . . . . . Group of *C. validiuscula*.
- b<sup>1</sup>.—A short or rudimentary lunella below one or two palatal plicæ; no lower palatal plica (figs. 9, 10), . . . . . Group of *C. sublunellata*.
- b<sup>2</sup>.—A lunella developed.
- c.—No palatal plicæ; plica principalis subobsolete or wanting; superior lamella separated from the spiral lamella (fig. 5), . . . . . Group of *C. hyperolia*.
- c<sup>1</sup>.—Superior continuous with the spiral lamella; principal plica well developed; an upper palatal plica present. Clausilium curved, concave on the inner face.
- d.—Lunella bow-shaped (fig. 6) or J-shaped (fig. 7), united to the upper palatal plica, curved inward below; superior and spiral lamellæ united, . . . . . Group of *C. awajensis*.



- d*<sup>2</sup>.—Lunella slightly curving inward below, not united above with the upper palatal plica (fig. 8). Clausilium rapidly tapering to the mucronate apex, . . . . . Group of *C. munus*.
- d*<sup>1</sup>.—Lunella straight, joined to the middle of the upper and lower palatal plicæ, like the letter I (fig. 1), . . . . . Group of *C. aulacophora*.
- c*<sup>2</sup>.—Superior and spiral lamellæ contiguous or separated; lunella curving inward below, joining the short palatal plica above. Clausilium unusually straight and flat, rounded at the apex, Group of *C. Pinto*.

A somewhat different sequence of groups would result from using the characters of the clausilium for the primary divisions, but while probably more natural, such an arrangement would be more difficult in practical use. The clausilium is variously specialized in the groups of *C. ptychochila*, *C. munus* and *C. Pinto*, much alike in the other groups. The only species, so far as I know, not provided for in the above key is *C. platydera*, which belongs without doubt to the *platyauchen* group, but has the receding and straightened inferior lamella of the other division; but there are also some forms partially intermediate between the groups of *C. validiuscula*, *C. sublunellata* and *C. aulacophora*, and further knowledge will doubtless reveal various other intermediate species. The group of *C. validiuscula* is probably a composite one.

*Group of C. sublunellata.*

*Clausilia sericina* var. *rhopalina* nov.

Shell rimate, fusiform, rather obese below, the upper half attenuated; pale yellow; very finely striate throughout, the sculpture not coarser on the last whorl. Outlines concave above, the apex obtuse. Whorls 10, moderately convex, the last compressed laterally. Aperture ovate, somewhat oblique; peristome continuous, white, reflexed and thickened, the upper margin in contact with preceding whorl. Superior lamella oblique, marginal, continuous with the spiral lamella which ascends to the middle of the ventral side. Inferior lamella thick and forming a rather conspicuous fold deep in the aperture, straightly ascending within, and penetrating as far as the spiral lamella. Subcolumellar lamella deeply immersed, terminating about a half whorl within. Principal plica visible deep in the throat, ascending to a lateral position. Upper



palatal plica narrow, oblique, lateral, well separated from the straight, oblique, low and narrow lunella. Lower palatal plica subobsolete or wanting.

Length 18.3, diam. 4.3 mm.

Length 17, diam. 4.3 mm.

Clausilium very narrow, parallel-sided, a little excised on the palatal side of the apex.

Mikuriya, Suruga. Types No. 82,298 Coll. A. N. S. P., from No. 736*b* of Mr. Hirase's collection.

This somewhat club-shaped form is noticeable for its fine striation and pale color. The narrow lunella is longer than in other species of the group which I have seen. *C. sericina*, which has not been figured nor very fully described, seems to be its nearest relative.

*Group of C. awajiensis.*

This group comprises *Hemiphaedusæ* in which the lateral or latero-dorsal lunella is J-shaped or bow-shaped, its upper end being united to the middle, or sometimes to the lower end, of a short upper palatal plica, the lower end curving inward. The clausilium is typical of *Hemiphaedusa*, being parallel-sided, not oblique or thickened at the distal end, and usually it is emarginate on the columellar side of the filament.

The species are numerous on Shikoku Island, and will probably prove difficult to limit when more localities are explored and further slightly differentiated races come to light. Others are known from Awaji, western Nippon and Kiushiu. None have come to my hands from middle or northern Nippon, or from Yesso.

Species with J-shaped lunella: *C. awajiensis* Pils., *C. perignobilis* and var. *kochiensis* Pils., *C. ischna* and var. *neptis* Pils., *C. subaurantiaca* Pils., *C. harimensis* Pils. and *C. higoensis* Pils.

Species with bow-shaped lunella: *C. ignobilis* Sykes, *C. shikokuensis* Pils.

*Clausilia higoensis* Pilsbry. Pl. XXXV, figs. 1, 2, 3, 4.

Pilsbry, these *Proceedings* for 1901, p. 499 (October 2, 1901).

Distinct by its inflated shell, attenuated above, and with a more or less developed wave or crest behind the outer lip. In some specimens this is strongly developed (Pl. XXXV, fig. 3), much as in



*C. oxycyma*; in others (fig. 4) it is hardly noticeable; but there are intermediate specimens.

The type locality is not Midumate, as at first announced, but Minamata, Higo. The specimens figured are from that place. Perfectly similar forms have been sent from Togo, Satsuma, No. 760 of Mr. Hirase's collection.

*Clausilia ischna* Pilsbry. Pl. XXXV, figs. 15, 16.

Pilsbry, these *Proceedings* for 1901, Vol. LIII, p. 500 (October 2, 1901).

Shell rimate, fusiform, *very slender, the length about five times the diameter*, attenuated above, brown or pale brown, somewhat glossy, finely striate, more coarsely so behind the lip. Whorls  $11\frac{1}{2}$ , moderately convex, the last somewhat flattened above, having a low swelling some distance behind the lip, a little produced forward. Aperture piriform, small, slightly oblique. Superior lamella rather strong, marginal, slightly oblique, continuous with the spiral lamella. Inferior lamella receding, not visible in a front view, but in oblique view seen to be quite strong; straightly ascending within the last whorl, and giving off a distinct branch toward the spiral lamella; its spiral portion weak, shorter and much lower than the spiral lamella, reaching inward to a ventral position. Subcolumellar lamella deeply immersed, its lower end barely visible or not visible within the aperture. Principal plica visible in the throat, extending inward a little past a lateral position. Lunella lateral, straight and joining the middle of a very short upper palatal plica above, curving strongly inward below. Peristome reflexed, continuous, emarginate at the termination of the superior lamella.

Clausilium long and parallel-sided, deeply emarginate on the columellar side of the filament.

Length 16.5, diam. 3.3, length of aperture 3 mm.

Length 15.7, diam. 3 mm.

Kochi, Tosa, Shikoku Island (Mr. Y. Hirase, No. 657a). Types No. 81,580 Coll. A. N. S. P.

The somewhat stouter, paler var. *neptis* is similar to *C. ischna* internally.

This species is more slender than any other known member of the group of *C. awajensis*, and has more whorls. The closing apparatus is similar to that of several other species of the group. It differs from *C. subaurantiaca* from Deyai, Nagato, in the follow-



ing respects: The surface is more coarsely striate; the last whorl does not have a convex belt above the position of the principal plica, and has more of a swelling on its latter portion; the spire has one more whorl. It remains to be seen whether intergrades exist between this species from Shikoku and *subaurantiaca* from the Province of Nagato in western Nippon. They are certainly closely related.

*Group of C. Pinto.*

Small, solid *Hemiphaedusa* with the clausilium unusually straight and flat, rounded or a little tapering at the apex, abruptly bent near the filament and emarginate or excised on the columellar side thereof. Superior lamella contiguous to or separated from the spiral lamella, which is short, barely reaching the ventral side. Inferior lamella deeply receding, straightened and strong inside.

This group has some affinity to *Zaptyx* in both shell and clausilium, but it has not the accessory lamellæ and plicæ of that section. It is not closely related to other Hemiphaedusan groups.

Two species, from the islands Tane-ga-shima and Yaku-shima, are known: *C. Pinto*, in which the last whorl is normal, and *C. ptychocyma*, which has a wave or crest and several strong wrinkles behind the outer lip.

*Clausilia Pinto* Pilsbry. Pl. XXXV, figs. 12, 13, 14.

Pilsbry, these *Proceedings*, Vol. LIII, p. 501 (October 2, 1901).

Shell very small, fusiform, solid and strong, flesh-colored, weakly marked with slight growth-wrinkles, eroded in irregular spots. Spire regularly tapering to a rather small apex. Whorls about 8, the last without crest or other conspicuous sculpture behind the lip. Aperture small, squarish-ovate, the lip somewhat reflexed, very thick, white, hardly free above. Superior lamella marginal, contiguous to the spiral lamella, which penetrates barely to the ventral side. Inferior lamella very deeply receding, high and stout within the last whorl, subvertically ascending, a trifle sinuous, extending inward as far as the spiral lamella. Subcolumellar lamella emerging. Principal plica less than a half whorl long, extending shortly beyond the lunella. Lunella lateral, straight and joining a short upper palatal plica above, curving well inward and ending in a slight nodule below.

Length 9.5, diam. 2.6 mm.

Length 8.5, diam. 2.3 mm.



Clausilium (Pl. XXXV, fig. 13) remarkably straight, rounded at the apex, abruptly bent near the filament, and very deeply excised on the columellar side of the latter.

Tane-ga-shima, Osumi, in the northeastern group of the Riukiu Islands. Types No. 82,553 Coll. A. N. S. P., from No. 663 of Mr. Hirase's collection.

A smaller species than *C. ptychocyma*, with the last whorl plain and normal, not strongly sculptured, as *C. ptychocyma* is. The solid, smoothish shell, short spiral and columellar lamellæ, and peculiarly flat clausilium are the same in both species.

At the time I wrote a preliminary account of the Tane-ga-shima and Yaku-shima snails these points of relationship were not appreciated, and I took a wrong view of the affinities of *C. pinta*.

*Clausilia ptychocyma* Pilsbry. Pl. XXXV, figs. 7, 8, 9.

Pilsbry, these *Proceedings* for 1901, Vol. LIII, p. 501 (October 2).

Shell obesely fusiform, rather acutely tapering above, buff or in part pale reddish, extremely solid and thick, weakly striate, almost smooth. Whorls 9, the latter part of the last whorl having a strong wave or crest, accompanied by several smaller but strong wrinkles, behind and parallel to the outer lip. Aperture small, squarish-ovate, the peristome slightly expanded, thick, hardly free above. Superior lamella low and small but stout, separated from the spiral lamella, which runs inward barely to the ventral side. Inferior lamella very deeply receding, strong and obliquely ascending inside, penetrating as far as the spiral lamella. Sub-columellar lamella immersed, its lower end visible in an oblique view in the aperture, sometimes very weakly emerging. Principal plica rather short, visible deep in the throat and extending shortly past the lunella. Lunella lateral, weak, straight above, curving inward below and joining or contiguous to a very short, nodule-like lower palatal plica.

Length 11, diam. 3 mm.

Clausilium (Pl. XXXV, fig. 10) parallel-sided, remarkably straight in profile, tapering on both sides and slightly acuminate below, excised on the columellar side of the filament.

Tane-ga-shima, Osumi. Types No. 81,932, Coll. A. N. S. P., from No. 664a of Mr. Hirase's collection.

An exceedingly solid little *Clausilia*, quite unlike *C. tanega-shimæ* in its immersed or nearly immersed subcolumellar lamella,



and especially in the clausilium, which is unusually straight and not in the least oblique at the apex.

*Clausilia ptychocyma* var. *yakushimæ* Pilsbry. Pl. XXXV, fig. 11.

Pilsbry, *l. c.*

Yaku-shima, Osumi. Types No. 81,934 Coll. A. N. S. P., from No. 664*b* of Mr. Hirase's collection.

#### Section TYRANNOPHÆDUSA Pilsbry.

Clausilium obliquely truncate distally, the columellar side of the apex slanting, strongly thickened along the inner face. Shell having the superior and spiral lamellæ contiguous or separated, the inferior lamella deeply receding, straight or obliquely ascending inside; spiral and columellar lamella usually continued within past the ventral side; lunella united to both upper and lower palatal plicæ or separated from the upper plica, usually latero-ventral or ventral in position. Type *C. mikado* Pils.

The characters of this section were only imperfectly perceived when it was originally proposed last year. Further investigation shows it to be quite distinct from *Hemiphædusa* (which resembles it in the receding inferior lamella), by the oblique and thickened end of the clausilium. Moreover, the lamellæ extend further inward, the closing apparatus retreats more deeply; there is often a crest on the neck parallel to the outer lip, and in some species the lip is plicate in the subcolumellar region, and there may be interlamellar folds.

The section includes three groups of species, distinguished as follows:

*a.*—A strong crest behind the outer lip, *Group of C. tanegashimæ*.

*a*<sup>1</sup>.—No distinct crest.

*b.*—Lunella curving inward above (concurrent with the outer end of the upper palatal plica), *Group of C. bilabrata*.

*b*<sup>1</sup>.—Lunella straight; together with the palatal plicæ forming an I-shaped barrier, or separated from the upper palatal plica, . . . . . *Group of C. mikado*.

#### *Group of C. bilabrata.*

Tyrannophædusæ of ordinary form, with the clausilium oblique and thickened at the apex, excised on the columellar side of the filament. Superior and spiral lamellæ separated or nearly so, the spiral and inferior extending inward to or past the ventral side.



Inferior lamella obliquely or somewhat spirally ascending within. Subcolumellar lamella emerging, usually in a group of lip-folds.

Lunella ventral or lateral, rather straight above, united below to a lower palatal plica. No upper palatal plica.

The oblique end of the clausilium, disconnected superior and spiral lamellæ, and frequent development of a group of lip-folds are the chief characters of this group. It differs from the *mikado* group by the absence of an upper palatal plica and the discontinuous superior and spiral lamellæ. The plication of the lip in the region of the inferior and subcolumellar lamellæ varies from strongly developed to obsolete in each of the species known among individuals from most localities.

- a.*—Peristome notched on the left side of the superior lamella. Shell obese below, the upper, attenuated portion thick, apical whorl large; length about 15 mm., . . . *C. surugensis*.
- a*<sup>1</sup>.—Peristome not notched or emarginate near the superior lamella.
- b.*—Early whorls almost always self-amputated in adults. Length 17–25 mm., dependent upon the number of whorls retained, as well as upon the size of the individual; diam. 4½–6 mm., . . . *C. bilabrata*.
- b*<sup>1</sup>.—Apex entire; shell slender, acutely tapering above, the first whorl minute; length 12–15, diam. 3–3½ mm., . . . *C. Oseariana*.

*Clausilia bilabrata* Smith. Pl. XXXVI, figs. 17–24.

*Clausilia bilabrata* E. A. Smith, Quarterly Journ. of Conchology, I, p. 120. Boettger, Jahrb. d. D. Malak. Ges., 1878, p. 103, with var. *ptycholæma*, Pl. 4, fig. 6. Kobelt, t. c., p. 96, Pl. 9, fig. 12. Möllendorff, Nachr'bl. d. D. Malak. Ges., 1900, p. 109.

As no good illustration of this species has appeared, it is figured here for comparison with the two new forms of the same group, and to show the local variations.

The shell is strong, almost always truncate and plugged in adults, 7 to 10 whorls usually remaining. It varies in color from straw-yellow to rather dark brown. It is very finely striate, attenuated above, the last whorl laterally compressed. Aperture ovate, the peristome reflexed and well thickened, very shortly free above, usually but not always corrugated by several or many folds grouped around the subcolumellar lamella. The superior lamella is marginal, rather small, and separated from or sometimes almost continuous with the spiral lamella, which penetrates past the ventral side. The inferior lamella recedes very deeply, is not visible



from the mouth, except for a slender continuation across the lip parallel with the subcolumellar lamella in most specimens, but often wanting. It ascends rather straightly but obliquely inside, and continues inward as far as the spiral lamella. The principal plica is almost a whorl long, approaching the aperture, and continued within past the ventral side. The lunella is latero-ventral or almost ventral, oblique, almost straight, but curved a trifle inward above, and connected with a strong lower palatal plica very near its inner end.

The clausilium (Pl. XXXVI, figs. 20, 21) is parallel-sided, very obliquely cut off and thickened on the columellar side of the apex. It is deeply emarginate or excised on the columellar side of the filament.

I have received specimens from the following localities: Nippon—Kobé, Setsumi; Takaya, Bitchu; Toyonishikami, Nagato. Senzan, Awaji. Shikoku: Ushirogawa and Okinoshima, Tosa. Kiushiu: Fukuregi and Yatsushiro, Higo.

The distribution of *C. bilabrata* includes southwestern Nippon, Awaji and Shikoku Islands, Kiushiu and the Iki Islands; the latter locality on the authority of Dr. O. von Möllendorff, who records specimens collected by Fruhstorfer.

While there is some variation from place to place, I do not see grounds for the definition of any races or subspecies, except the variety defined by Boettger, which I have not seen. The degree of plication of the right margin of the peristome is subject to wide individual variation in *C. bilabrata*, *C. Oseana* and *C. surugensis*.

Specimens from Kobé are pale colored, retain  $7\frac{1}{2}$ –9 whorls, and either have the right margin plain, except for the emerging inferior and subcolumellar lamellæ (fig. 17), or many-folded (fig. 19). They measure between, alt. 22.5, diam. 5.5 mm., whorls 9, and alt. 20, diam. 4.8 mm., whorls 8. At Takaya, Bitchu, the shells are larger, and vary from a single emerging lamella, the subcolumellar, to three or four folds. Alt. 25, diam. 5.8 mm., whorls  $8\frac{1}{2}$ ; alt. 21, diam. 6 mm., whorls  $7\frac{1}{2}$ . They are corroded, and more or less clothed with green algæ on the back (figs. 23, 24).

Toyonishikami, Nagato. Dark reddish-brown, with the lunella decidedly latero-ventral, and the principal plica shorter; lip with numerous folds. Alt. 23.5, diam. 5.6 mm., whorls  $9\frac{1}{2}$ .



Senzan, Awaji. Like Kobé shells, but sometimes smaller. Alt. 20, diam. 5 mm., whorls 8; alt. 17, diam. 4.5 mm., whorls  $7\frac{1}{2}$ .

Okinoshima, Tosa. Specimens like those from Kobé, but the lip is sometimes appressed, not free above, and the superior lamella scarcely marginal. Plication of the subcolumellar region variable.

Ushirogawa, Tosa. Slightly smaller than Kobé shells and, like the preceding lot, more opaque, the lunella not visible from the outside.

One specimen, sent at a different time from this locality (Pl. XXXVI, fig. 22), retains the apex perfect, is reddish-brown, slightly translucent, and has a much shorter principal plica, extending but a short distance beyond the lunella. There are 13 whorls, the earlier ones translucent-white. Length 25.5, diam. 5.9 mm.

Fukuregi, Higo, Kiushiu. Rather small, with few or many subcolumellar plications. Alt. 19, diam. 5 mm., whorls 9.

Yatsushiro, Higo. Larger than the preceding; peristome often somewhat more solute than in Kobé shells, and the mouth a little narrower. Alt. 2.4, diam. 5 mm., whorls  $10\frac{1}{2}$ ; alt. 21, diam. 5 mm., whorls  $8\frac{1}{2}$ .

*Clausilia plicilabris* var. *ptycholæma* Boettger.

"Shell larger, more distinctly striate, the last whorl more strongly rib-striate. Aperture longer, the peristome less calloused and reflexed. Length (decollate)  $20\frac{1}{2}$ – $27\frac{1}{2}$ , diam.  $5\frac{1}{2}$ – $6\frac{3}{4}$  mm."

"Seluchi, between Hiuga and Bugo" (Rein).

*Clausilia Oscariana* Pilsbry. Pl. XXXVI, figs. 30, 31.

Pilsbry, in these *Proceedings* for 1901, Vol. LIII, p. 499 (October 2, 1901).

Shell rimate, fusiform, rather acutely attenuated above, the early whorls retained in adults; dingy brown; finely striate. Whorls  $10\frac{1}{2}$  to  $11\frac{1}{2}$ , slightly convex, the last perceptibly constricted behind the lip. Aperture ovate-piriform, the sinus a little retracted; peristome very shortly free above, not emarginate at the position of the superior lamella, reflexed and thickened, *crossed by several folds (sometimes subobsolete) in the vicinity of the subcolumellar lamella*. Superior lamella marginal, rather low, slightly oblique, *widely separated from the spiral lamella*, the latter reaching a ventral position within. Inferior lamella very deeply receding, scarcely visible from the mouth, extending inward nearly



as far as the spiral lamella. Subcolumellar lamella emerging to the lip-edge, several folds usually grouped around it. Principal plica strong, reaching from the dorsal to the ventral side. Lunella lateral, strong, slightly curving inward above, united below to the lower palatal fold near its inner end.

Length 14.7, diam. 3.5 mm.

Length 12, diam. 3 mm.

Fukuregi, Province Higo, Kiushiu. Types No. 81,930 Coll. A. N. S. P., from No. 674 of Mr. Hirase's collection.

Related to *C. bilabrata* Smith, but only about half as large, with fewer whorls, not subject to truncation, and more attenuated above. The lunella is more lateral. In *C. surugensis* the spire is much less slender. Named in honor of Dr. Oscar Boettger.

*Clausilia surugensis* n. sp. Pl. XXXVI, figs. 25, 26, 27.

Shell rimate, *obese below, attenuated above*, whitish under a pale brownish-yellow cuticle, which is mainly eroded from the specimens examined; finely striate. Whorls 10, the first rather large, next three or four scarcely increasing in diameter, the last two or three whorls quite swollen. Aperture piriform with rather distinct sinulus, peristome narrowly reflexed and thickened, varying from nearly smooth to *densely plicate along the columellar margin; notched to the left of the superior lamella*. Superior lamella rather small, a more or less distinct groove on each side of it, and a very small fold or lamella close to it on the left; not continuous with the spiral lamella, the latter continued inward past the ventral side. Inferior lamella very deeply receding, strongly spiral within, continuing inward as far as the spiral lamella. Subcolumellar lamella emerging. Principal plica a half whorl long, extending from a dorsal to a ventral position. The lunella is subventral, curves inward above, and is weakly united with, or slightly separated from, the middle of a rather long, oblique, lower palatal plica.

Length 15, diam. 3.7 mm.

Length 14.3, diam. 3.8 mm.

Clausilium (Pl. XXXVI, figs. 28, 29) oblique and somewhat thickened at the apex, a little excised or emarginate on the columellar side of the filament.

Mikuriya, Suruga. Types No. 81,902 Coll. A. N. S. P., from Mr. Hirase's No. 688.

This species is much smaller than *C. bilabrata*, which is not



known from so far north or northeast. It is more attenuated above, and the peristome is notched on the left side of the termination of the superior lamella.

*Group of C. tanegashimæ.*

Solid and strong *Tyrannophædusæ* with the clausilium oblique and thickened distally, the superior lamella separated from the spiral lamella, which penetrates past the ventral side, accompanied by the inferior lamella; lunella subventral; subcolumellar lamella strongly emerging. There is a strong ridge or crest behind the outer lip, parallel with it.

Similar to the group of *C. bilabrata* in internal structure, but differing in the crest behind the lip. Species are known from the northeastern group of Riukiu Islands, and from southern Kiushiu. Species two: *C. oxycyma*, with a distinct upper palatal plica developed, length 14 mm., and *C. tanegashimæ*, which has the upper palatal plica represented only by an inward bend of the upper end of the lunella, length 16-18½ mm.

*Clausilia oxycyma* n. sp. Pl. XXXVII, figs. 35, 36, 37, 38.

Shell rimate, fusiform, rather slender, attenuated above, glossy, rather dark red-brown when unworn; finely striate, a little more coarsely so on the last whorl. Whorls  $9\frac{3}{4}$  to nearly 11, moderately convex, the last three whorls of almost equal diameter, last whorl compressed laterally, tapering, rising into a strong, rather acute ridge or crest a short distance behind the lip and parallel with it. Aperture piriform, slightly oblique, brown within; peristome narrowly reflexed, continuous, white, scarcely emarginate at the position of the superior lamella. Superior lamella small, marginal, slightly oblique, not continuous with the spiral lamella. Spiral lamella very high within, of equal length with the inferior lamella, both continuing past a ventral position. Inferior lamella very deeply receding, twisted within. Subcolumellar lamella emerging to the lip-edge, bounded by grooves. Principal plica strong, reaching from the dorsal to the ventral side. Lunella latero-ventral, oblique, joining the middle of strong, rather long, oblique, upper and lower palatal plicæ.

Length 14, diam. 3 to  $3\frac{1}{2}$  mm.

Clausilium (Pl. XXXVII, figs. 41, 42) moderately curved, the



distal end very oblique and thickened on the columellar side, the proximal end emarginate on the columellar side of the filament. The middle of the palatal margin projects.

Kagoshima, Satsuma, in southern Kiushiu. Types No. 81,925 Coll. A. N. S. P., from Mr. Y. Hirase's No. 695.

Similar to *C. tanegashimæ* and *C. ptychocyma* in the strong crest behind the outer lip, but different from both in palatal armature. No other Japanese species has any similar structure of the last whorl.

*Clausilia tanegashimæ* Pilsbry. Pl. XXXVII, figs. 32, 33, 34.

Pilsbry, these *Proceedings* for 1901, Vol. LIII, p. 500 (October 2).

Shell fusiform, rather acutely tapering above, very solid, somewhat glossy, brown, very weakly striate except the last whorl. Whorls about  $10\frac{1}{2}$ , moderately convex, the last having a *strong, acute ridge or crest* a short distance behind the outer and basal lips. Aperture ovate-piriform, the sinulus a trifle retracted; peristome reflexed, somewhat thickened, very shortly free or almost adnate above. Superior lamella small, vertical, marginal, widely separated from the spiral lamella, the latter extending inward past the ventral side. Inferior lamella emerging in a slender cord parallel to the subcolumellar lamella, otherwise very deeply receding, within very strong and obliquely ascending, penetrating as far as the spiral lamella. Subcolumellar lamella emerging to the lip-edge, bounded by grooves. Principal plica about a half-whorl long, extending from a dorsal position (visible within the throat) to just past the lunella. Lunella well developed, subventral, somewhat curved inward above, connected below with the inner end of a long oblique lower palatal plica.

Length 18.5, diam. 4.2 mm.

Length 16, diam. 4 mm.

Length 16.2, diam. 3.7 mm.

The clausilium (Pl. XXXVII, figs. 39, 40) is similar to that of *C. bilabrata*, being oblique and thickened at the apex, and excised on the columellar side of the filament.

Tane-ga-shima, Osumi, Northeastern Group of the Riukiu Islands.

Types No. 81,933 Coll. A. N. S. P., from No. 662 of Mr. Hirase's collection. Also occurs on Yakushima, No. 662*b* of Mr. Hirase's collection.

This is a much larger species than *C. ptychocyma*, with emerging



subcolumellar lamella and sharper, higher crest behind the outer lip. *C. oxycyma* scarcely differs from *tanegashimæ* externally except in its smaller size, but it has a well developed upper palatal plica, which is represented in *tanegashimæ* by only a short inward bend of the lunella. The palatal margin of the clausilium is straight in *C. tanegashimæ*.

Specimens from Yaku-shima agree with those of Tane-ga-shima in solidity and size. The lunella is low above and its inward bend above, though low, is rather pliciform. I did not receive these specimens until recently, or I would have named the species differently, since it proves to extend beyond Tane-ga-shima.

*Group of C. mikado.*

This group is well developed in the provinces about the upper (eastern) end of the Inland Sea. Probably *C. plicilabris* A. Ad., described from Tanabe, Kii, will prove to belong here, near *C. aurantiaca* and the following species. I formerly thought it might be identical with *C. bilabrata* Smith.

*Clausilia orthatracta* n. sp. Pl. XXXVII, figs. 44, 45, 46.

Shell rimate, slenderly and straightly fusiform, rather solid, of a pale brown tint. Surface lusterless, finely striate, the striæ perceptibly coarser, though still fine and close, on the latter part of the last whorl. The upper whorls are almost smooth from wear in the specimens seen. Spire nearly straight-sided, attenuated and nearly cylindric above, the apex rather large. Whorls 12, the earlier convex, the later ones flattened, last whorl compressed laterally, noticeably constricted behind the lip, especially near and at the base; and there is generally a stronger riblet where the expansion of the lip begins (fig. 45). Aperture oblique, retracted at the base and sinulus, piriform and small. The peristome is continuous and stands forward free from the preceding whorl; is white, thickened, expanded and reflexed, weakly emarginate at the position of the superior lamella or not noticeably so. Superior lamella marginal, oblique, continuous with the spiral lamella, which is low at first, but rises high in the region of the closing apparatus, and penetrates inward past the aperture to a lateral position on the left side. The inferior lamella recedes deeply, though the lower end continues to the lip-edge. It is straightened within, and pene-



trates nearly or quite as deeply as the spiral lamella. The sub-columellar lamella emerges to the lip-edge, is bounded by grooves, and there is sometimes some weak crenation of the lip below it. The principal plica approaches the lip, and is about one whorl long. The narrow, straight lunella stands in a ventro-lateral position, and is connected above and below with short but higher upper and lower palatal plicæ (fig. 46).

Length 16, diam. nearly 3, length of aperture 3 mm.

Length 15, diam. 3, length of aperture 3.2 mm.

The clausilium (fig. 43) resembles that of *C. oxycyma*; the palatal edge being a little swollen in the middle. The distal end is oblique and strongly thickened, as usual.

Akasaka, Province Mino, Japan. Types No. 82,273 Coll. A. N. S. P., from No. 748 of Mr. Hirase's collection.

This *Tyrannophædusa* stands between *C. aurantiaca* Btg. and *C. iotaptyx* Pils. It is more slender than either, and differs from them in the shape of the spire and the relatively smaller aperture.

Compared with *C. aurantiaca* var. *hypoptychia* Pils., the present species is seen to differ in the straighter lateral outlines and larger apex.

#### Section STEREOPHÆDUSA Btg.

This section comprises four groups of species: The group of *C. valida*, restricted to the middle Riukiu Islands;<sup>1</sup> the group of *C. japonica*, known from Nippon and Shikoku; the group of *C. brevior*, now known from Nippon, Kiushiu and the Riukiu Islands, and the group of *C. entospira*, containing a single species from Tane-ga-shima.

The group of *C. japonica* includes the following large species:

1. *C. japonica* Crosse. Synonyms of the typical form are *C. kobensis* Smith and *C. nipponensis* Kobelt. There cannot be much doubt that *C. eurystoma* v. Mart. is a pathologic individual of the same.

A var. *pallens* has been distinguished by von Möllendorff, and I have defined var. *interplicata*. There remain several other more or less well-marked races, which it seems to me inadvisable to name until their distribution can be more fully studied. In Idzumo Province a large, dark race occurs, which

<sup>1</sup> These *Proceedings* for 1901, Vol. LIII, p. 410.



agrees with *C. Hilgendorfi* v. Mart. in everything except the sutural plica which is said to characterize that species.

2. *C. Hilgendorfi* v. Mart. Probably a subspecies of *C. japonica*.

3. *C. oostoma* v. Möll. I have considered my *C. japonica* var. *surugæ* to be this species. The latter has a synonym, *C. eurystoma* subsp. *brachyptychia* Mildff.

4. *C. subjaponica* Pils.

The group of *C. brevior* consists of smaller species, of which the first two, from the middle part of Nippon, have no lunella, while in *C. Stearnsii*, *Addisoni*, *Jacobiana* and *hondana* a lunella is developed, at least in some individuals.

5. *C. brevior* v. Mart. Includes *C. tetraptyx* Mildff.

6. *C. nikkoensis* Mildff.

7. *C. hondana* Pils.

8. *C. Stearnsii* Pils.

9. *C. Jacobiana* Pils.

10. *C. Addisoni* Pils.

11. *C. stereoma* Pils. with varieties *nugax* and *cognata*.

I have elsewhere described and figured *C. hondana* and *C. Stearnsii*. *C. nikkoensis* I have not yet seen. The other species of the *brevior* group are described below.

In the typical *Stereophædusæ* there are either several palatal plicæ, or only the upper and lower. In *C. hondana*, *Addisoni*, *Stearnsii*, *Jacobiana* and *stereoma* a low, straight lunella stands between the upper and lower plicæ. This lunella, in fully adult individuals, is a smooth ridge, without higher points or irregularities; but in some individuals, viewed from the outside, a row of short light markings is seen, as though a series of palatal plicæ stood in place of the lunella. When this is not obvious from the outside, it appears when the shell-wall and lunella are viewed by transmitted light. This indicates local differences in the substance of the shell, affecting its refracting qualities; and it occurred to me that a row of plicæ is first formed, and subsequently the spaces between them are filled in. Upon examining specimens of *C. Jacobiana* not quite mature, in which the peristome was not fully formed, I found that this was what actually takes place. Such shells have no lunella whatever, but in its place a series of four or five short plicæ (Pl. XXXIX, fig. 68).

These facts indicate that the ancestral *Stereophædusæ* had a



palatal armature of short palatal plicæ, precisely similar to the structure still extant in certain other groups, *Megalophædusa* for instance. This became modified in two modes: (1) The intermediate plicæ degenerated, resulting in such forms as typical *C. japonica*, in which only the upper and lower plicæ remain, or (2) the intermediate plicæ coalesced to form a lunella.

That the loss of an even series of plicæ has been a very recent one in *Stereophædusa* is indicated by several facts. In species which normally have but two palatal plicæ sometimes individuals or races occur in which small intermediate plicæ are developed;<sup>2</sup> and in species with a lunella, the earlier structure of a row of plicæ is perfectly developed in the stage of growth immediately preceding the adult stage.

Incidentally I may observe that the perplexing structural variation I formerly recorded in describing *C. hondana* is at least partially explained by what I find to occur in the *Stereophædusæ* of Kiushiu and Tane-ga-shima. I was dealing with a small series of shells, part of which were not absolutely mature.

*Clausilia brevior* v. Martens. Pl. XXXVIII, figs. 47, 48, 49, 50, 51.

Von Martens. Sitzungsberichte der Ges. Naturforsch. Freunde in Berlin, 1877, p. 109. Kobelt, Fauna Moll. Extramar. Jap., p. 78, Pl. 9, fig. 4 (bad).

*C. tetraptyx* v. Möllendorff, Journ. Asiatic Soc. Beng., LI, p. 7, Pl. 1, fig. 7 (1882); 1885, p. 61.

This species is not recognizably figured in Kobelt's work. For the purpose of more exact comparison with *C. Addisoni*, a fuller account of the species than has been published is given below.

The shell is *thin*, obesely fusiform, *much attenuated* and concave-sided near the apex, the last three whorls inflated, the last half of the last whorl more or less compressed, often conspicuously narrower than the preceding whorl, as in the "*nipponensis*" form of *C. japonica*. Pale yellowish brown; sharply, very obliquely striate or rib-striate. Whorls about  $9\frac{1}{2}$ , the apex minute, but the following whorl disproportionately large; next few whorls very slowly increasing. Aperture squarish-ovate, the peristome expanded, somewhat reflexed, thickened and white, hardly free above, the upper margin parallel to the sutures. Superior lamella thin and high, marginal, continuous with the spiral lamella which

<sup>2</sup> The evidence of this will be presented in a future paper dealing with the *C. japonica* group of *Stereophædusa*.



penetrates to or past the middle of the ventral side. Inferior lamella approaching the superior, forming a strong, subhorizontal fold; inside it ascends with a broad spiral trend, and penetrates nearly or quite as far as the superior lamella. The subcolumellar lamella emerges to the lip-edge. The principal plica is visible deep in the throat and ascends to a latero-ventral position. Palatal plicæ three or four, the first and fourth long, oblique; the second shorter; third very small or wanting, leaving a space.

Length 14 to 17, diam. 4 mm. (Von Martens' type).

Length 17.2, diam. 4.3 mm.; length 14, diam. 4 mm.; length 13.4, diam. 3.5 mm.; specimens from Tokyo.

Length 14.5, diam. 4.1 mm.; length 12, diam. 3.5 mm.; specimens from Nikko.

Length 17, diam. 3.7 to 4 mm.; specimen from Numazu, Suruga.

Clausilium (Pl. XXXVIII, figs. 52, 53) short and wide, broadest below, strongly arcuate, a little tapering and thickened at the apex, somewhat excised on the columellar side of the filament.

Misaki, Sagami, at the mouth of the Bay of Tokyo (Hilgen-dorf, type locality); Ashima, Izu (Hirase); Yokohama (B. Schmacker); Tokyo (F. Stearns); Nikko, Shimotsuke (Loomis); Fujisawa (Hungerford, type locality of *C. tetraptyx*); Numazu, Suruga (Hirase).

The small size for a *Stereophaedusa*, strongly attenuated early whorls, and thin shell are the more prominent differences between *C. brevior* and other species of the group.

The area of distribution so far indicated is a rather restricted district in middle Nippon. Mr. Hirase's fruitful researches in the southwestern half of Nippon and in Shikoku have not revealed the species there; nor has it yet appeared from as far north as the Province Uzen, whence a considerable number of small species have been sent. It seems to be a very abundant shell in the region about Tokyo Bay.

The variety *tetraptyx* Mldff. is a little darker brown, the peristome brown-tinted, at least in part, the palatal plicæ slightly longer than in typical *brevior*; but in the lot of some hundreds of specimens I have seen, these characters, except as to the tint of the lip, vary by insensible degrees, so that I do not see that *tetraptyx* has a valid claim to varietal distinction. One of the original



specimens of *tetraptys*, collected by Hungerford, is before me, kindly lent from the collection of Mr. E. R. Sykes.

*Clausilia Addisoni* Pilsbry. Pl. XXXVIII, figs. 56, 57.

*C. brevior* var. *Addisoni* Pils., these *Proceedings* for 1900, p. 677 (January 28, 1901). *C. Addisoni* Pils., t. c., p. 502, under *C. stercoma*.

Shell obesely fusiform, much attenuated and with concave outlines above, inflated below, the last whorl narrower and tapering. Light brown or corneous. Rather strongly and coarsely striate, more coarsely so on the last half whorl. Aperture squarish-ovate, the lip reflexed, somewhat thickened, white. Lamellæ about as in *C. brevior*. The subcolumellar lamella barely emerges or is continued to the lip-edge. The three palatal plicæ are slightly shorter than in *C. brevior*, and there is a very low, subobsolete, straight lunella, or at least a low callous deposit between the second and the lowest plicæ, and connected with the latter.

Length 18, diam. 4.2 to 4.7 mm., whorls  $9\frac{1}{2}$ .

Length 16, diam. 4.5 mm., whorls 9.

Ari-mura, a village on the southern side of Sakura Island, in Kagoshima Bay (Addison Gulick); Kagoshima and Kajima, Satsuma (Mr. Hirase); Isshochi, Higo (Hirase); all in southern Kiushiu.

This form is very much like *C. brevior*, of which I at first considered it a variety. It is slightly stronger, larger than any but the largest specimens of *brevior*, and differs in having a callous pad or rudimentary lunella above the lower palatal fold, and in the decidedly coarser striation. The clausilium is thicker at the apex, and the palatal side is more convex (figs. 54, 55).

Geographically it is very widely separated from all parts of the range of *C. brevior*; and as Mr. Hirase has not found either species at any of the multitude of intermediate localities explored by him or his collectors, it seems unlikely that there are any connecting forms in the intermediate territory—the southwestern half of Nippon and northern Kiushiu.

It is named in compliment to Mr. Addison Gulick, formerly of Osaka.

*Clausilia Jacobiana* n. sp. Pl. XXXIII, figs. 58-62; Pl. XXXIX, figs. 66-69.

Shell thin, brown, rimate, fusiform, the upper half rapidly tapering, several earlier whorls attenuated, the penultimate whorl



swollen, latter half of the last whorl compressed. Surface glossy, sculptured with strong, threadlike oblique striæ, 3 or 4 earlier whorls smooth, usually worn or eroded. Whorls 9 to  $9\frac{1}{2}$ , *quite convex*, and separated by deeply impressed sutures. Aperture slightly oblique, ovate-piriform, the peristome very shortly free above, expanded and reflexed, whitish, slightly emarginate at the position of the superior lamella, the sinulus a little retracted. Superior lamella slender, vertical, continuous with the spiral lamella, which extends inward to the middle of the ventral side. Inferior lamella forming a rather small but subhorizontal fold, not reaching out upon the lip, extending inward as far as the superior lamella. Subcolumellar lamella varying from barely immersed to rather weakly emerging. Principal plica a half-whorl long, extending from a dorsal position (visible deep in the throat) to a latero-ventral position. Upper and lower palatal plicæ rather short, lateral. Below the upper palatal plica there is a delicate second plica, from the outer end of which a low straight lunella runs to the lower palatal plica.

Length 15.5, diam. 3.6 mm. ; length 13.6, diam. 3.5 mm.

The clausilium (Pl. XXXIII, figs. 61, 62) has the general shape and curvature of that of *C. brevior* and *Addisoni*, but differs from both in having the apex more pointed, and it is more concave on the palatal side of the apex. The end is also more thickened than in *C. brevior*.

Tane-ga-shima, Osumi. Types No. 82,277 Coll. A. N. S. P., from No. 754 of Mr. Hirase's collection. Also Yaku-shima, No. 778 of Mr. Hirase's collection.

This species is related to *C. Stearnsii* Pils. of Okinawa and *C. Addisoni* Pils. of southern Kiushiu. It is much more slender than the latter, with more convex whorls and a more pointed clausilium. *C. Stearnsii* is a longer species, in which the early whorls are not so attenuated. These three species have a low and more or less well-developed lunella when adult, a structure occurring also in some specimens of *C. hondana*, but otherwise unknown in the *Stereophædusæ* of Nippon. In immature shells a row of short palatal plicæ stands in place of the lunella (fig. 68).

This *Clausilia* has the thin shell of the other species of the *brevior* group, while all other *Clausiliæ* known from Tane-ga-shima are extremely thick and strong.



It is named in honor of Dr. Arnöld Jacobi, author of excellent papers upon the soft anatomy of Japanese snails, the faunal relationships of Japan, etc.

The specimens from Yaku-shima are more solid than those from Tane-ga-shima, and the palatal armature seems to be less developed, the lunella being less distinct or absent. There are three palatal plicæ below the principal plica, the first, second and lowest. The sculpture and shape are not noticeably different, the largest and smallest sent measuring:

Length 13.8, diam. 3.3 mm.

Length 11.3, diam. 3 mm.

*Clausilia stereoma* Pilsbry. Pl. XXXIX, figs. 70, 71.

Pilsbry, these *Proceedings* for 1901, Vol. LIII, p. 502, with varieties *nugax* and *cognata* (October 2, 1901).

Shell rimate, *obesely* fusiform, the spire tapering rapidly, its upper fourth very slender; thick and extremely strong; olive yellow, glossy; the spire distinctly striate, last two whorls smoother except near the suture. Whorls about  $8\frac{1}{2}$ , convex, the penultimate whorl swollen, latter half of the last whorl compressed, tapering. Aperture ovate, vertical, flesh-tinted within; peristome white, reflexed and thickened within, continuous, though almost in contact with the preceding whorl above. Superior lamella rather slender, oblique, continuous with the spiral lamella. Inferior lamella strong, subhorizontal, approaching the superior lamella, strongly spiral within, both spiral and inferior lamellæ penetrating to the middle of the ventral side. Subcolumellar lamella emerging but not extending to the lip-edge. Principal plica very short, lateral; palatal plicæ four, the upper one long, converging inwardly toward the principal plica, the lower plica shorter, strong, a little curved; two intermediate plicæ minute, punctiform, hardly perceptible.

Length  $21\frac{1}{2}$ , diam. 6 mm.

Length  $19\frac{1}{2}$ , diam.  $5\frac{1}{2}$  mm.

Clausilium very short and broad, acuminate and thickened distally, very strongly arcuate (Pl. XXXIX, figs. 63-65).

Yaku-shima, Osumi, in the Northeastern Group of the Riukiu Islands. Types No. 81,737 Coll. A. N. S. P., from No. 670 of Mr. Hirase's collection.

This fine species is the most solid and strong *Stereophædusa*



known. The obese lower whorls and strongly attenuated spire show relationship to *C. Addisoni* Pils. of Kiushiu, and *C. brevior* v. Mart. of middle Nippon—both comparatively thin shells. The two intermediate palatal plicæ are likely to prove inconstant.

*Clausilia stereoma* var. *nugax* Pilsbry. Pl. XXXIX, figs. 78, 79.

Much smaller and more slender than the type, which it resembles in color and sculpture. Very solid.

Length  $13\frac{1}{2}$  to  $14\frac{1}{2}$ , diam. 4 mm.

Length  $16\frac{1}{2}$ , diam.  $4\frac{1}{4}$  mm.

Also from Yaku-shima, probably from a different locality. Types No. 81,576 Coll. A. N. S. P., from No. 671 of Mr. Hirase's collection.

*Clausilia stereoma* var. *cognata* Pilsbry.

Rich reddish-brown, thinner than the types, though still very strong, with about 9 whorls. Palatal plicæ four or five, the intermediate ones very small.

Length  $23\frac{1}{2}$ , diam.  $6\frac{1}{2}$  mm.

Length 22, diam.  $6\frac{1}{2}$  mm.

Length  $21\frac{2}{3}$ , diam.  $6\frac{1}{3}$  mm.

Tane-ga-shima. Types No. 81,578 Coll. A. N. S. P., from No. 661 of Mr. Hirase's collection.

As in the type, the palatal plicæ are often visible through the shell, and from the outside appear longer and more prominent than they are found to be on opening the shell.

#### *Group of C. entospira.*

Shell thick, small, the inferior lamella thick and squarish below (not forming a spiral fold on the columella, as in other *Stereophædusæ*), very strongly spiral within; a stout, lunate lunella developed, but no palatal plicæ except the principal one. Clausilium very strongly arcuate, slowly and much tapering below to the subacute, thickened apex, wide above, deeply emarginate on the columellar side of the filament.

The single species known of this very distinct group has obviously arisen from the *Stereophædusan* stock; but it is more specialized than any other known member of *Stereophædusa*, both in palatal armature and clausilium.



*Clausilia entospira* Pilsbry. Pl. XXXIX, figs. 72-75.

Pilsbry, these *Proceedings*, Vol. LIII, p. 501 (October 2, 1901).

Shell rather obesely fusiform, attenuated, with somewhat concave outlines above, extremely thick and strong, nearly smooth, glossy, the latter half of the last whorl becoming coarsely striate; flesh-colored with buff patches and streaks, eroded in spots. Whorls about  $8\frac{1}{2}$ , convex, the last tapering below. Aperture long-ovate, the peristome slightly reflexed, very much thickened within, shortly free above. Superior lamella small but rather stout, marginal, very widely separated from the spiral lamella, which is quite small, short and latero-ventral. Inferior lamella receding, in oblique view (fig. 72) appearing very prominent and squarish; *very strongly spiral within*, heavily thickened at the lower end, ascending merely to a lateral position. Subcolumellar lamella immersed, interrupted within. Principal plica slender, short and low, lateral. Lunella latero-ventral, oblique, curved, running inward below, tapering at the ends, *excessively thick and strong* in the middle. No palatal plicæ.

Length scarcely 10, diam. 2.4 mm.

Clausilium (Pl. XXXIX, figs. 76, 77) moderately long, but being strongly curved near the middle, nearly at a right angle, it appears short; distal half rapidly tapering, straight along the palatal, convex at the columellar side, thickened at the apex. Proximal half rather wide and parallel-sided; deeply excised on the columellar side of the filament.

Tane-ga-shima, Osumi, one of the Northeastern Group of the Riukiu Islands. Types No. 82,558 Coll. A. N. S. P., from No. 663a of Mr. Hirase's collection.

A few examples were with the specimens of *C. Pinto*. Mr. Hirase remarks that it is very rare. It is an excessively peculiar species, and I was formerly at a loss as to its affinities. The broadly spiral trend of the inferior lamella, which is moreover very short within, the weak, short spiral lamella and principal plica and the peculiar lunella are a combination of features unlike any Oriental species known to me. The squarish lower end of the inferior lamella is sometimes visible in a front view (fig. 74), but in other specimens it *recedes, and is seen only in oblique view* (figs. 72, 73). The clausilium is quite unlike that of any other known Japanese species. The lunella might almost as well be considered a greatly



developed lower palatal plica, as it is no doubt in part homologous with that.

The shell is excessively solid and thick, stronger in fact than any other species of such diminutive stature known to me; but unusual solidity is a characteristic of the *Clausiliæ* of Tane-ga-shima and Yaku-shima, common to the *Stereophædusæ*, *Hemiphædusæ* and *Tyrannophædusæ* alike, and clearly to be correlated with some factor in the environment acting upon the entire series.

#### EXPLANATION OF PLATES XXXV-XXXIX.

PLATE XXXV (HEMIPHÆDUSA). Figs. 1-6.—*Clausilia higoensis*. Types. Figs. 7-10.—*Clausilia ptychocyma*. Type. Fig. 11.—*Clausilia ptychocyma* var. *Yakushimæ*. Type. Figs. 12-14.—*Clausilia Pinto*. Type. Figs. 15, 16.—*Clausilia ischna*. Type.

PLATE XXXVI (TYRANNOPHÆDUSA). Figs. 17-21.—*Clausilia bilabrata*. Specimens from Kobé, the type locality.

Fig. 22.—*Clausilia bilabrata*. Specimen retaining the apical whorls, from Ushirogawa, Tosa, No. 81,926 Coll. A. N. S. P.

Figs. 23, 24.—*Clausilia bilabrata*. Specimens from Takaya, in which the surface is corroded, covered with algæ dorsally. No. 79,719 Coll. A. N. S. P.

Figs. 25-29.—*Clausilia surugensis*. Types.

Figs. 30-31.—*Clausilia Oscariana*. Types.

PLATE XXXVII (TYRANNOPHÆDUSA). Figs. 32-34.—*Clausilia tanegashimæ*. Type.

Figs. 35-38.—*Clausilia oxycyma*. Types.

Figs. 39, 40.—*Clausilia tanegashima*. Clausilium.

Figs. 41, 42.—*Clausilia oxycyma*. Clausilium.

Fig. 43.—*Clausilia orthatracta*. Clausilium.

Figs. 44-46.—*Clausilia orthatracta*. Type.

PLATE XXXVIII (STEREOPHÆDUSA). Figs. 47, 48.—*Clausilia brevior*. Specimen from Coll. E. R. Sykes

Figs. 49-53.—*Clausilia brevior*. Specimens from Tokyo. No. 18,801 Coll. A. N. S. P.

Figs. 54-57.—*Clausilia Addisoni*. Types.

Figs. 58-62.—*Clausilia Jacobiana*. Tanegashima, Osumi.

PLATE XXXIX (STEREOPHÆDUSA). Figs. 63-65.—*Clausilia stereoma*. Clausilium, Fig. 64, from the columellar edge.

Figs. 66-69.—*Clausilia jacobiana*. Fig. 68 represents the palatal armature of an immature shell.

Figs. 70, 71.—*Clausilia stereoma*. Type.

Figs. 72, 73.—*Clausilia entospira*. Fig. 72 is an oblique view in the aperture, from below and the left side.

Figs. 74-77.—*Clausilia entospira*. Type. Figs. 76, 77 reconstructed from a broken clausilium.

Figs. 78, 79.—*Clausilia stereoma* var. *nugax*. Type.





Pilsbry, Henry Augustus. 1901. "Additions to the Japanese Land Snail Fauna: V." *Proceedings of the Academy of Natural Sciences of Philadelphia* 53, 622–646.

**View This Item Online:** <https://www.biodiversitylibrary.org/item/38485>

**Permalink:** <https://www.biodiversitylibrary.org/partpdf/84666>

**Holding Institution**

MBLWHOI Library

**Sponsored by**

MBLWHOI Library

**Copyright & Reuse**

Copyright Status: NOT\_IN\_COPYRIGHT

This document was created from content at the **Biodiversity Heritage Library**, the world's largest open access digital library for biodiversity literature and archives. Visit BHL at <https://www.biodiversitylibrary.org>.