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|---|--------------------------------------|
| <i>Pitar affinis</i> Gmel. | <i>Strombus galeatus</i> Sby. |
| <i>Pitar alternata</i> Brod. | <i>Strombus peruvianus</i> Sby. |
| <i>Pitar lupanaria</i> Less. | <i>Surcula olivacea</i> Sby. |
| <i>Pitar unicolor</i> Sby. | <i>Tegula impressa</i> Jonas |
| <i>Planaxis nigritellus</i> Fbs. | <i>Tegula mariana</i> Dall |
| <i>Plicatula dubia</i> Han. | <i>Tegula rubroflammulatum</i> |
| <i>Polinices glauca</i> Han. | Koch. |
| <i>Polinices otis</i> Brod. & Sby. | <i>Tegula viridulum</i> Gmel. |
| <i>Pustularia pustulata</i> Lam. | <i>Tellina moeropsis</i> Dall |
| <i>Pyramidella panamensis</i> Dall & Bch. | <i>Terebra albocincta</i> Cpr. |
| <i>Rissoina stricta</i> Mke. | <i>Terebra luctuosa</i> Hds. |
| <i>Sanguinolaria tellenoides</i> A. Ad. | <i>Thais biserialis</i> Blv. |
| <i>Saxicava arctica</i> L. | <i>Thais patula</i> L. |
| <i>Semele flavescens</i> Gld. | <i>Thais triangularis</i> Blv. |
| <i>Semele simplicissima</i> Pils. & Lowe | <i>Thais triserialis</i> Blv. |
| <i>Siphonaria lecanium</i> Phil. | <i>Tivela planulata</i> Brod. & Sby. |
| <i>Siphonaria maura palmula</i> Cpr. | <i>Tonica forbesi</i> Cpr. |
| <i>Siphonaria pica</i> Sby. | <i>Trivia pacifica</i> Gray |
| <i>Sistrum ferrugineum</i> Rve. | <i>Turritella goniosoma</i> Val. |
| <i>Spondylus calcifer</i> Cpr. | <i>Turritella tigrina</i> Kien. |
| <i>Strigella fucata</i> Gld. | <i>Vasum caestus</i> Sby. |
| | <i>Vermetes centiquadratus</i> Val. |
| | <i>Vermicularia pellucida</i> Brod. |

ON THE PROBABLE CAUSE OF CERTAIN VARIATIONS IN COLOR OF THE SHELL IN THE GENUS *LIGUUS*

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Studying carefully the coloration in the different species and varieties of land snails included in the genus *Liguus*, we can observe that the coloration is highly variable from the young to the adult; moreover, as the turns or whorls of the spire remain exposed in this genus, the coloration changes notably from the apex to the last whorl. This variation in coloration is practically infinite. At first glance it does not seem to follow any rule or arrangement; but as we study the different types of coloration and its multiple combinations it is possible to observe that they follow certain standards, which we will attempt to decipher so as to indicate the probable underlying causes.

We will describe first the different types and afterward their combinations.

In the first place it is possible to consider the patterns in two large groups, according to whether the color dyes the periostracum or the shell.

In the genus *Liguus* the periostracal coloration is confined to green spiral lines, variable in number and width, and present in nearly all specimens. These green periostracal lines are not subject to variation with age, and they remain constant in cases of melanism, xanthism, or albinism, so frequent in *Liguus*. At the same time, each green periostracal line ends in a notch in the outer lip of the shell which is thereby crenulated. This character is produced with or without the existence of other lines or colors, and was referred to by Swainson in naming the variety known as *Liguus fasciatus crenatus* Swainson.

This name is usually applied to all forms which possess green lines only on a white ground, or in other words, forms which are *albinos* so far as color of the shell under the periostracum is concerned. This actually includes as many albinos as there are species and varieties in the genus. This is very easy to demonstrate by comparing the shape of each of them with that of the albino having green lines only.

The other patterns of coloration belong properly to the shell, not to the periostracum, and form more or less continual spiral lines and bands (never green), and alternating, dark and light, complete or incomplete, flame shaped, transverse bands, that may coexist or not with the others.

Let us see now the distribution of this different type of coloration upon the shell. The shell has a white background on which the colors are distributed, covering it sometimes completely (melanism). The spiral bands are disposed in two series, one in the visible portion of the spire, the other basal, leaving between them a wide band that may bear in the middle a central dark line corresponding to the sutural line. In both zones, limited by the bands, are disposed the alternating bands that may be so short as to be merely series of spots (*Liguus blainianus* Poey, *Liguus pictus* Reeve, etc.). The alternating bands may become cloudy.

We are going to see now the disposition of color in different

portions of the shell. The embryonic shell, first and second whorls, are uniformly colored (white, pink, or brown); in the third, fourth and fifth whorls predominate the alternating bands, very well defined; in the sixth and seventh the alternating bands may become cloudy; in the last portion of the seventh whorl all coloration disappears gradually or abruptly, totally or partially, with the sole exception of the green periostracal bands. These do not vary at all, or they may become strongly marked. All other spiral lines vary in color and intensity with the growth of the shell.

Probable causes of some of these variations.—It has been observed that food may change coloration (some melanic forms by tannin), but color-changes during life cannot be thus explained.

If we observe carefully the life of *Liguus* we will detect that the first important change coincides with sexual maturity, then the second, and the last comes with old age, the intense coloration disappearing more or less abruptly, leaving only well and persistently marked the green periostracal lines; so it appears that the changes correspond to the appearing and the disappearing of the sexual hormones. These changes exist also in other genera.

A NEW PSEUDOCHEMA FROM CLARION ISLAND, MEXICO

BY G. WILLETT

One of the results of a recent trip to islands off the west coast of Mexico was the discovery of a *Pseudochama* that does not appear to have been hitherto described. It may be known as:

PSEUDOCHEMA CLARIONENSIS, new species. Pl. 4, figs. 1, 2.

Shell sinistral. Upper valve roughly circular, flattened; with irregular, rugose, spiral wrinkles; posterior three fourths of the valve decorated with short, laminated, grooved spines; anterior margin with several projecting, spatulate folds. Lower valve rather flat; attached for the greater part of its area; unattached portion with low, rugose cords running in various directions, and sparsely ornamented with thin, projecting laminae. Ground color of both valves bright salmon-red, spines and folds usually white, but some of the latter colored red like the main part of the shell. Color of interior white, clouded with rose. Each valve



Torre, Ricardo de la. 1938. "On the probable cause of certain variations in color of the shell in the genus *Liguus*." *The Nautilus* 52, 46–48.

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