

The Conchological Society of Great Britain and Ireland

(Founded 1876)

Papers for Students No. 9

THE IDENTIFICATION OF BRITISH CHITONS

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(Adapted by the author from her paper "A Key for use in the Identification of British Chitons", 1952 Proc. malac. Soc. Lond. 29: 241 - 248)

Winkworth (1932 *J. Conch* 19, No. 7: 211 - 252) lists twelve species of Chiton. Their identification presents many difficulties to the field worker and general zoologist and it is to these, rather than to the experienced conchologist, that this key is addressed. All who are interested in chitons will be familiar with the intense disappointment experienced on reading ecological surveys in which the authors, having enumerated in detail long lists of mollusc species, on reaching the Loricata end tamely with *Chiton* sp!

Many of the existing descriptions rely largely on subtle differences in the marking and colour of the shell and on radula characters. In certain species colouration is an extremely variable feature and its description based on somewhat subjective interpretation, or worse, as the following quotation from Jeffreys (1865 *British Conchology* 3: 223) well illustrates: "Two specimens of *Chiton marginatus* in Turton's collection, affixed to separate cards, are named in the Doctor's handwriting *Chiton ruber*, one from Dublin Bay and the other from Portmarnock... Both have been painted red! A daughter of Dr. Turton told me that when her father went out shell-hunting, some young ladies would occasionally go before him on the beach, and drop here and there shells which they had taken with them, in order to play him a merry trick. Let us suppose that these were the artists who so ingeniously beautified the specimens above noticed..."

CLASS LORICATA

1. Toothed insertion plates present, Girdle with spines and/or granules. ORDER CHITONIDA (2)
1. Insertion plates rarely present and never toothed. Girdle bearing finely sculptured plates and often spines. ORDER LEPIDOPLEURIDA. Family Lepidopleuridae (4)
2. Girdle bearing 18 to 20 tufts of conspicuous bristles. Family Cryptoplacidae (10)
2. Upper surface of girdle covered with granular and/or acicular spines but without conspicuous tufts of bristles. (3)
3. Upper surface of girdle covered with broad, smooth, imbricating granules. More than eight slits in the head valve. Insertion teeth smooth. Low water to sub-littoral. Family Ischnochitonidae. *Ischnochiton albus* Linné.
3. Upper surface of girdle covered with fine granules or acicular spines. Insertion teeth coarsely denticulate. Family Lepidochitonidae (7)
4. Insertion plates on the anterior valve only. Upper surface of girdle bearing fine scales and numerous spines, the latter being well developed near the hinder edge of each valve. Well marked, raised tubercles on the lateral areas of the shell valves. *Hanleya hanleyi* (Bean)
4. No insertion plates. Upper surface of the girdle bearing finely sculptured imbricating scales. (5)
5. Girdle narrow. Shell valves highly arched and without distinct breaks or keel. (6)
5. Girdle narrow and bearing on its upper surface delicate, overlapping, longitudinally ridged, rectangular scales. Shell valves keeled and with distinct beaks. Sub-littoral. *Lepidopleurus asellus* (Gmelin)
6. Shell valves highly arched and bearing slight moniliform granulations. Upper surface of girdle covered with delicately ribbed scales with scroll-like tips. Littoral, low tide level. *L. cancellatus* (Sowerby)
6. Shell valves arched and bearing well-marked sculpturing especially on the hind valve and in the lateral areas of the intermediate valves which give it a rough appearance. Upper surface of the girdle covered with longitudinally ribbed, rectangular scales and some spines. Base of foot marked lengthwise with six red lines. Littoral, low tide level. *L. scabridus* (Jeffreys)

7. Girdle broad and bearing acicular spines. Pigmented "eyes" on the head and tail valves and on the lateral areas of each intermediate valve. Shell notches 15/6/6/6/6/6/6/15 (approx.). Littoral and sub-littoral. *Callochiton achatinus* (Brown)
7. Girdle somewhat narrower and bearing on its upper surface rounded granules and fringed with fine marginal spines. One pair of notches only in the insertion plates of each intermediate shell valve. Shell notches 8/2/2/2/2/2/10 (approx.) (8)
8. Usually 16 or more pairs of ctenidia. Almost holobranch condition (i.e. occupying the greater part of the pallial groove). (9)
8. Usually between 10 and 15 pairs of ctenidia, Merobranch condition (i.e. restricted to posterior part of the pallial groove). Upper surface of the girdle bearing small, closely packed, ovoid granules and fringed with spatulate marginal spines. Low water to sub-littoral. *Tonicella rubra* (Linné)
9. Ctenidia numerous — usually more than 19 pairs. Girdle pale, leathery and bearing on its upper surface minute, widely separated granules and fringed with spatulate marginal spines. Low water to sub-littoral. *T. marmorea* (Fabricius)
9. Ctenidia 16 to 19 pairs. Upper surface of girdle covered with sub-spherical, variously pigmented granules of irregular size. Marginal spines well-developed and cigar shaped. Littoral. *Lepidochitona cinerea* (Linné)
10. Girdle bearing 19 or 20 tufts of bristles. Littoral and sub-littoral. *Acanthochitona discrepans* (Brown) non Jeffreys.
10. Girdle bearing 18 tufts of bristles. (11)
11. Girdle of moderate width. Valve sculpture in the form of large tear-shaped granules somewhat unevenly distributed. Littoral and sub-littoral. *A. crinita* (Pennant)
11. Girdle broader than in the above species. Valve sculpture consisting of minute rounded granulations, densely crowded and evenly distributed. Littoral. *A. communis* (Risso) (= *A. discrepans* Jeffreys)

Notes to assist in the use of this key (see also the accompanying figures).

- I. *The number and arrangement of the ctenidia.* These are the small branched structures which serve as gills and which can be seen in the groove between the foot and the mantle when the animal is viewed from beneath. Their arrangement is characteristic for any given species and a useful guide to identification. In the merobranch condition the ctenidia occur in the posterior part of the body only whereas in the holobranch condition they occur along almost the whole length of the pallial groove as shown below.
The number of pairs of ctenidia present can only be given approximately as in most species it increases with age. There is also considerable variation in the number possessed by individuals of the same species within the same size range.
- II. *Valve sculpture.* This can best be observed by using a hand lens after thoroughly drying the shell surface with blotting paper.
- III. *Examination of the insertion plates.* The insertion plates are portions of the shell embedded in the body musculature. In order to examine them a portion of the valve should be dissected free of the girdle tissue and the exposed area of shell examined with a hand lens. Members of the ORDER Chitonida have toothed insertion plates but these are usually completely lacking from members of the Lepidopleurida.
- IV. *Girdle spicules and marginal spines.* These are useful identification guides and usually distinguished with the aid of a hand lens. Where doubt arises a small piece of girdle may be removed and boiled in 10% KOH, mounted and examined under a $\frac{3}{4}$ objective. It will be noticed that in members of the ORDER Lepidopleurida the girdle covering is in the form of delicate ribbed scales whereas in members of the ORDER Chitonida the girdle is covered by rounded or elongate granules.

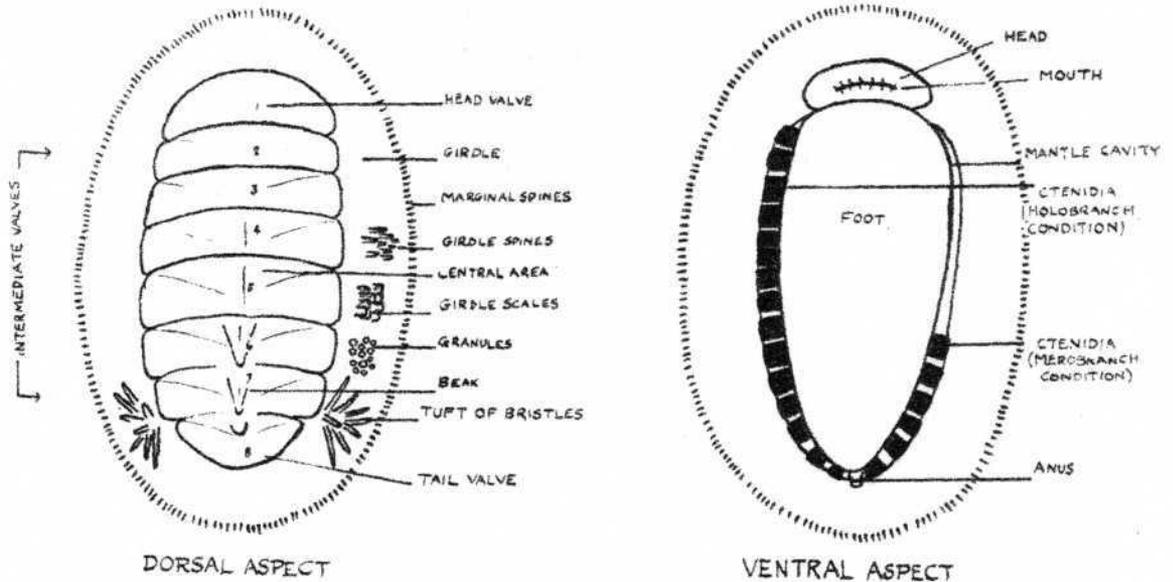
| Species | Arrangement and number of ctenidia | Typical number of shell notches present | Shell beak | Max. length | Girdle granulation | |
|---|--|---|------------|-------------|--|--|
| 1. <i>Lepidopleurus aselus</i> (Gmelin 1791) | Merobranch (8—13 pairs) | Absent | Yes | 19 mm | Sculptured scales. Rectangular and imbricating. Some spines. | |
| 2. <i>L. cancellatus</i> (Sowerby 1839) | Merobranch (6—8 pairs) | Absent | No | 9 mm | Sculptured scales. Delicately ribbed. Scroll-like. | |
| 3. <i>L. scabridus</i> * (Jeffreys 1880) | Merobranch — | Absent | No | 7 mm | Sculptured scales. Rectangular. Some spines. | |
| 4. <i>Hanleya hanleyi</i> † (Bean 1844) | Merobranch (12—19 pairs) | Absent | Yes | 19 mm | Spines and scales present.† | |
| 5. <i>Tonicella marmorea</i> (Fabricius 1780) | Merobranch to Holobranch (17—26 pairs) | 8 to 10 | 8 to 10 | Yes | 40 mm | Minute, sparse, granules. |
| 6. <i>T. rubra</i> (Linné 1767) | Merobranch 10—15 pairs | 8 | 9 to 10 | Yes | 19 mm | Small, closely packed, ovoid granules and occasional spines. |
| 7. <i>Lepidochitona cinerea</i> (Linné 1767) | Almost holobranch 16—19 pairs | 8 | 10 to 12 | Yes | 19 mm | Variouly pigmented, subspherical granules uneven in size. |
| 8. <i>Callochiton achatinus</i> (Brown 1827) | Holobranch 20—25 pairs | 15 to 20 | 15 to 20 | Yes | 30 mm | Uniformly arranged aricular spines. |
| 9. <i>Acanthochitona crinita</i> (Pennant 1777) | Merobranch | 5 | 11 | Yes | 21 mm | Spinous, with 18 tufts of bristles. |
| 10. <i>A. discrepans</i> (Brown 1827) | Merobranch | 5 | 11 | Yes | 31 mm | 19 or 20 tufts of bristles. |
| 11. <i>A. communis</i> (Risso 1826) | Merobranch | 5 | 11 | Yes | 43 mm | 18 tufts of bristles. Girdle very broad. |
| 12. <i>Ischnochiton albus</i> (Linné 1767) | Merobranch | 13 | 11 to 12 | Yes | 14 mm | Relatively large, smooth, imbricating granules. |

* Dried specimens only available for study.

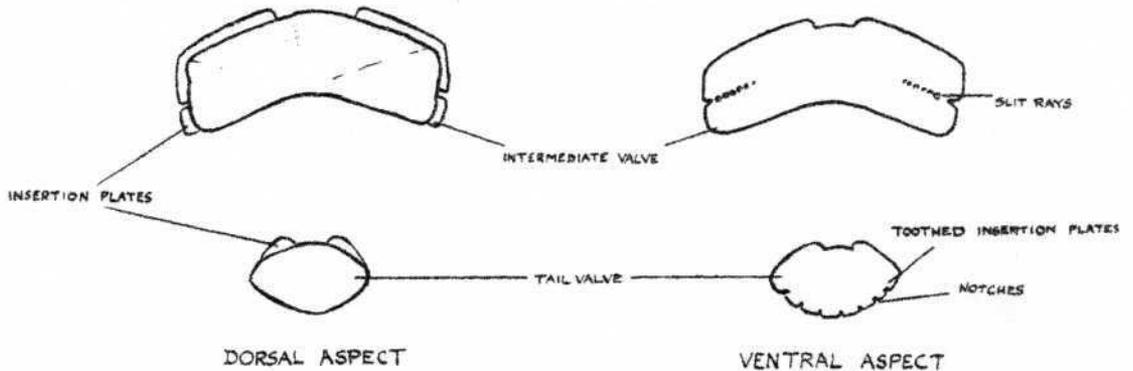
† From figures given in Plate, L.H. zool. Jb. (1901).

Date of publication 15th May, 1967.

Reprinted: 22nd November, 1976



COMPOSITE DIAGRAM of CHITONS



SHELL VALVES

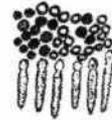
LEPIDOPLEURUS CANCELLATUS



TONICELLA RUBRA



LEPIDOCHITONA CINEREA



LEPIDOPLEURUS ASELLUS



TONICELLA MAEMOREA



CALLOCHITON ACHATINUS



MARGINAL SPINES and GIRDLE SPICULATION