Group 1 exhibits teeth of a very simple character. Group 2 is closely allied to Group 1, the most marked point of contrast being the bifid cusp in the lateral. Group 3 is by far the most specialized as regards radula, and, while preserving a certain tie of kinship, stands well apart from the other two, both as regards shape and denticulation of the rhachidian and in the elaboration of the cusps of the laterals.

It is hoped that the facts now brought together may be of use, as throwing light on the general inter-affinities of the group as a whole, and possibly on the vexed question of distinction of species.

EXPLANATION OF FIGURES.

FIG.

1. *Cominella adelaidensis*, Crosse : Australia.
2. ,, *alveolata*, Kien. (= *lineolata*, Lam.) : Port Phillip.
3. ,, *eburnea*, Reeve (= *costata*, Quoy) : New Zealand.
4. ,, *filicea*, Cr. & Fisch. : Port Jackson.
5. ,, *quoyana*, A. Ad. (= *huttoni*, Kob.) : New Zealand.
6. ,, *lineolata*, Lam. : Tasmania.
7. ,, *lurida*, Phil. : New Zealand.
8. ,, *adspersa*, Brug. (= *maculata*, Mart.) : New Zealand.
9. ,, *maculosa*, Mart. : New Zealand.
10. ,, *virgata*, H. & A. Ad. : New Zealand.
11. ,, *elongata*, Dunk. : Cape of Good Hope.
12. ,, *tigrina*, Kien. : South Africa.
13. ,, *delalandii*, Kien. : St. James', Cape Town.
14. ,, *lagenaria*, Lam. : Cape of Good Hope.
15. ,, *limbosa*, Lam. : Sea Point, Cape Town.
16. ,, *porcata*, Gmel. : Algoa Bay.

A COLONY OF *NUCELLA* (OLIM *PURPURA*) *LAPILLUS* (LINN.) WITH OPERCULUM MALFORMED OR ABSENT.

By the Rev. A. H. COOKE, Sc.D., F.Z.S.

Read 9th March, 1917.

VISITING Lydstep (a few miles west of Tenby) in August, 1915, at a very low tide, I took a living specimen of *N. lapillus* off the face of the cliff, and observed that it had no operculum. Thinking that perhaps the act of pulling the specimen off the rock had torn the operculum away, I examined further specimens, with the result that it appeared that this particular colony of *Nucella* were suffering, to a considerable extent, from malformation of the organ.

Of 121 specimens examined,

(1) The operculum was more or less perfect in 54.
(2) ,, ,, decidedly imperfect in 56.
(3) ,, ,, absent altogether in 11.

In class 2 the imperfection was not always of the same nature. Sometimes the operculum was considerably reduced in size, so that, when the animal was withdrawn, only a portion of the aperture was covered. Occasionally the operculum was perfect as regards size, but was thin, and of a very light horn colour, almost white, instead

of dark brown or black. Sometimes the forward edge was ragged and untrimmed, instead of being sharp and clearly rounded.

In the cases where the operculum was absent altogether, the area left uncovered was not smooth, as it is when one peels off an operculum from a perfect specimen. The surface where the operculum should have been was contracted, wrinkled, and raised into knotty humps, as if the animal were making some effort to compensate for such protection as is afforded by the operculum, by a thickening of the integument in that area.

What particular purpose is served by the operculum in this and many other kindred species of Mollusca is not quite clear, since the animal remains normally adherent to the rock by its foot, on some point on the upper surface of whose hinder portion the operculum is carried. It is only when the animal becomes detached from its position that the operculum closes the mouth of the shell, and it is clear that to become detached is the last thing which is desirable for species which normally live adherent; in many cases they must be unable to regain their position.

In the present case it seemed probable that overcrowding and under-feeding were the cause of the defects of the *Nucella*. In size the shell was not more stunted than specimens to be found on almost any exposed coast. But there must have been thousands of them on the perpendicular cliffs at Lydstep, clinging closely together, and with no food but barnacles and an occasional limpet. Under such circumstances it is not surprising that signs of decadence should manifest themselves.

It never seems possible to predict what particular form of decadence will result from any given diminution of the optimum of environment. The only case at all parallel to this, as far as *Nucella* is concerned, occurred in a group of *N. lapillus* found living at Minehead. Near the harbour, where the water is specially muddy, and the holding ground foul with decayed wood and lumps of rotten clay, specimens occur whose shells are riddled with some boring worm, with the result that they are decollate, the suture often deeply pitted, and the base of the columella and the outer lip eaten away and ragged. so that the whole shell presents a most forlorn and wretched appearance. Yet, in every case examined, the operculum was perfectly normal in shape, size, colour, and thickness.

THE RADULA OF THE GENUS *EUTHRIA*, GRAY.

By the Rev. A. H. Cooke, Sc.D., F.Z.S.

Read 13th April, 1917.

The generic name *Euthria* appears to cover a variety of species which in certain points differ widely from one another. Founded by Gray in 1850 (Fig. Moll. Anim., No. 67), its type is the Mediterranean *cornea*, L. Kobelt catalogued[1] the genus in 1878. Suter recognizes[2]

[1] Jahrb. Deutsch. Malak. Gesell., vol. v, 1878, pp. 237–8.

[2] Manual New Zealand Mollusca, 1913, pp. 373–81.