- (3.) Family *Labrosauridæ*. Lower jaws edentulous in front. Cervical and dorsal vertebræ convexo-concave. Pubes slender, with anterior margins united. Astragalus with ascending process.

Genus, *Labrosaurus*.

- (4.) Family *Zanclodontidæ*. Vertebræ bi-concave. Pubes broad elongate plates, with anterior margins united. Astragalus without ascending process. Five digits in manus and pes.

Genera, *Zanclodon*, ? *Teratosaurus*.

- (5.) Family *Amphisauridæ*. Vertebræ bi-concave. Pubes rod-like. Five digits in manus, and three in pes.

Genera, *Amphisaurus* (*Megadactylus*), ? *Bathygnathus*, ? *Clepsysaurus*, *Pulæosaurus*, *Thecodontosaurus*.

Sub-order CÆLURIA.

- (6.) Family *Cæluridæ*. Vertebræ and bones of skeleton pneumatic. Anterior cervicals convexo-concave; remaining vertebræ bi-concave. Cervical ribs coossified with vertebræ. Metatarsals very long and slender.

Genus, *Cælorus*.

Sub-order COMPSOGNATHA.

- (7.) Family *Compsognathidæ*. Cervical vertebræ convexo-concave; remaining vertebræ bi-concave. Three functional digits in manus and pes. Ischia with long symphysis on median line.

Genus, *Compsognathus*.

Of these seven well-marked families, the *Amphisauridæ* and *Zanclodontidæ* are Triassic, the *Megalosauridæ* are Jurassic and Cretaceous, while the others are all Jurassic alone.

There are still some very diminutive carnivorous Dinosaurs that cannot at present be referred to any of the above families; but this may in part be due to the fragmentary condition in which their remains have been found.

The peculiar orders *Hallopoda* and *Aëtosauria* include carnivorous reptiles which are allied to the *Dinosauria*, but they differ from that group in some of its most characteristic features. In both *Aëtosaurus* and *Hallopus*, the calcaneum is much produced backwards. In the former genus, the entire limbs are crocodilian, and this is also true of the dermal covering. In *Hallopus*, the calcaneum is greatly lengthened, and the whole posterior limb is especially adapted to leaping. In both of these genera, there are but two sacral vertebræ, but this may be the case in true Dinosaurs, especially from the Trias. Future discoveries will probably bring to light intermediate forms between these orders and the typical Dinosaurs.

III.—LAND SHELLS IN THE RED CRAG.

By ROBERT G. BELL, F.G.S.

PERHAPS very few Tertiary formations have received a greater amount of attention from geologists and collectors of fossils, during the last forty years, than the Red Crag of Suffolk and Walton-Naze; and it seems singular that so few traces of land life have resulted from so much research. Although in its southern portions it is strictly a marine deposit, yet its distance from shore could not have been very great at any point; but putting aside the few plants and mammalian remains, most of which in the coprolite portion of the Red Crag are derivative, there is little evidence of its proximity.

In that part of Suffolk near Chillesford and around the small

village of Butley, the later beds of the Red Crag appear, and land and freshwater shells are found in small numbers, but still exceedingly rare and scattered: they occur in most of the pits of that neighbourhood intermixed with marine mollusca, principally of an arctic and boreal type, and with some American forms of *Pleurotoma*, which have not been noticed elsewhere; but there is no evidence of a freshwater or even estuarine formation here, no shells of that character being present; there are no *Hydrobia*, only one *Conovulus* (*pyramidalis*), an occasional Periwinkle, *Cardium edule*, fairly plentiful but always of marine form, and the whole of the shelly and sandy beds indicate, as Mr. Searles V. Wood has observed, a foreshore deposit.

The land and freshwater shells are all of living British species, are generally common in the recent state, and make their appearance in these beds for the first time. They are as follows:—

<i>Helix hispida</i> .	<i>Planorbis spiroboris</i> .
<i>Bulinus lubricus</i> .	<i>Limnæa palustris</i> .
<i>Pupa marginata</i> .	„ <i>truncatulus</i> .
<i>Planorbis complanatus</i> .	„ <i>pereger</i> .

It is observable that all these species have a very wide range, extending through the whole of Europe from north to south, and the *Pupa* even into Iceland, so that in character they precisely agree with the whole of the marine fauna found with them, which is undoubtedly boreal, perhaps nearly arctic, in its general appearance.

In the older portion of the Red Crag, that is, from most of the pits and sections which occur about the rivers Deben and Orwell, and from Boyton and the cliff at Walton-on-Naze, which seem to be the oldest of all the beds, only one land-shell has been recorded since the specimen of *Helix Rysa* was described and figured by Mr. Searles Wood in 1848. This shell, which is of the same species, is in the Canham Collection at the Ipswich Museum, and came from the deep pit at Waldringfield close to the river. Lately, however, some careful work at Walton-on-Naze has resulted in the discovery of three more land shells in the lower beds, which it is desirable to notice, in the hope that future collectors at this well-known section may be able to increase the number.

With the exception of one fragment, these *Helices* have all been found in the lower and more tranquilly deposited beds of the Cliff. This portion is mainly composed of fine grey sand or silt, and lies between the London Clay and that band of single valves of *Pectunculus* and *Macra arcuata* which occurs about the same horizon in several parts of the cliff; immediately under this band the sand is finest, and the following shells have been found at various times:—

Helix Rysa, S. Wood.

Helix lens, Férussac. Figured in Reeve's "Conchologia Iconica," vol. vii. pl. 178, fig. 1221.

A small and not quite adult shell was found about three years ago by Mr. Larcher, of King's College, and was at first supposed to be a young specimen of *H. Rysa*; unfortunately, in consequence of the death of Mr. G. S. Gibson, of Saffron Walden, in whose collection the type specimen was placed, no comparison with it could be made,

and the shell did not appear to the writer to quite agree, either with the engraving or description given of that species by Mr. Wood, nor did it appear to have relation to *H. rufescens*, to which Dr. Jeffreys had assigned *H. Rysa* as a variety; but after a careful examination of a large series of European *Helices* in the cabinet of Mr. J. H. Ponsonby, it was recognized as identical with *H. lens*, a shell that has an entirely southern range in Europe, occurring only in Morea and the Greek islands (Pfeiffer); in this identification both Dr. Jeffreys and Mr. Ponsonby concur.

Helix incarnata, Müller. Figured, Moquin-Tandon, Moll. de France, pl. 16, fig. 6 and 7.

This shell was found by the Prince of Mantua (Mr. Groom-Napier), in the course of some extensive excavations made at Walton, in 1882, which resulted in the fine collection of Red Crag Mollusca shown at the Fisheries Exhibition last year. It is not perfect, but the mouth, first whorl, and base of the shell remain, and seem quite identical with this continental species; hitherto this shell has not been noticed earlier than the Copford deposits, where it is associated with several others now extinct in Britain.

Helix lactea, Müller. Figured, Reeve, Con. Icon., vol. vii. pl. 147, fig. 955a.

A fine example nearly perfect was found by the writer last summer; the first and second whorls, the base and mouth of the shell, are quite perfect, and it retains its bands of brown colour; in a recent state this species is limited to the Mediterranean shores of Spain, France, and North Africa, where it is plentiful; it was compared with a large series from various localities, and resembles an Algerian form more than any other; a fragment of this species was also found in the Upper Red Crag bed by the same collector.

A comparison of the present geographical range of the above three recent species with that of the land shells of the Butley beds will exactly carry out the deductions which can be made from a similar comparison with the Marine faunas of the two places. At Walton it is mainly southern; at Butley the number of northern, American, and even arctic shells is very considerable—such species as *Amaura candida*, *Cardium Greenlandicum*, *Trophon scalariforme*, *Natica Greenlandica*, and several of those species of *Pleurotoma* which only occur in cold latitudes, indicate a northern character. But the presence or absence of certain species in any given bed of Crag (the fauna of which is by no means worked out yet) is not such good evidence as the numerical preponderance or scarcity of the individuals of common forms. The immense numbers of cold area shells, such as *Tellina obliqua*, at Butley, with its extreme scarcity at Walton, where *Natica multipunctata* (extremely scarce at Butley), is perhaps the most prevalent and representative form, whose range is entirely southern, will show a fairly characteristic difference in the two deposits. The whole evidence shows the very considerable change which came over the character of the Mollusca of the British Seas, indicating the gradual lowering of temperature and the setting in of arctic currents, which had already begun to take place in the earliest times of the Red Crag.