

it had not proceeded beyond the stage of emergence of the radicle. Seven months after sowing, the seedlings in each tube were counted; also, the lengths of roots and shoots were measured. The means of these data for the six tubes at each reaction are plotted against pH in the accompanying graph. The bimodal form of curve *A* is clear, and a tendency to the same is perceptible in curves *B* and *C*. Others have observed this phenomenon in studies of the relations of various species to hydrogen ion concentration.

This experiment, which was performed in the Botany Department at the West of Scotland Agricultural College, confirms the field evidence that the optimal reaction for *Calluna* is in the region of pH 4. Above this level, not only do the germination of seeds and the growth of seedlings decline, but also chlorosis is progressively more marked. Even at pH 5, severe chlorosis of the tips occurred. Local rises in soil reaction might thus account for the frequent appearance of chlorotic heather plants in the field.

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¹ Fraser, G. K., Bull. Forest. Comm. No. 15 (1933).

² Heath, G. H., and Luckwill, L. C., *J. Ecol.*, 26 (1938).

³ Olsen, C., *C.R. Carlsberg Lab.*, 15 (1923).

Occurrence of a Species of *Clymenella* Verrill (Polychæta, fam. Maldanidæ) on the North Kent Coast

McINTOSH¹ states that "the representatives of the Maldanidæ are met with but seldom in British waters, and in the majority of instances only fragments are secured". In fact, a study of the literature reveals that many species, and even genera, are described from preserved material, often in a fragmentary condition. It is of interest to record, therefore, that a fairly large maldanid is moderately common in the intertidal zone at Whitstable near the ordinary low-tide mark.

The worm belongs to the genus *Clymenella* Verrill, and this is, so far as I can find out, the first record of a member of this genus occurring on the coasts of Britain, or, for that matter, on the coasts of Europe. Fauvel², it is true, describes a *Clymenella* (?) *cincta* from Manche (Dinard), but notes that "Cette espèce n'étant connue par un seul fragment antérieur de 12 sétigères, il n'est pas possible, vu l'absence de la région postérieure, de préciser exactement à quel genre elle appartient".

Monro³, in discussing the genus *Clymenella*, points out that there are two groups of species included in that genus, "the *torquata*, *rubrocincta*, *somersi* and (?) *elongata* group, with anterior *uncini* differing little, if at all, from their normal *uncini*, and the *minor*, *cincta* south-west Australian and Indian Ocean *Clymenella* sp. group, with anterior ventral *acicular hooks*".

The maldanid found at Whitstable clearly belongs to the *torquata* group and more closely resembles *Cl. torquata* than any other species. It may prove to be a new species; but this cannot be decided until a comparison has been made with specimens of *torquata* obtained from America.

Clymenella torquata and its allied species are reported solely (?) from the coasts of North America, and it is possible that the Whitstable maldanid may prove to be a recent immigrant comparable in this respect with *Urosalpinx cinerea* and *Crepidula fornicata*.

A description of the worm is in course of preparation.

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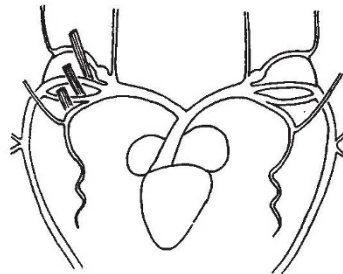
¹ McIntosh, W. C., "A Monograph of the British Annelids. Polychæta"; 3. "Opheliidæ to Ammochariidæ" (Ray Society, London, 1915).

² Fauvel, P., "Polychètes Sédentaires", Faune de France, 16 (Paris); pp. 182-83 (1927).

³ Monro, C. C. A., "Polychæta", John Murray Expedition, 1933-34, Scientific Reports, 4, No. 8 (1937); see p. 310.

Persistent Fifth Arterial Arch in the Frog

A RARE abnormality in the arterial system of the common frog was found in a male specimen from Cornwall. The fifth aortic arch persisted on both sides of the animal and was patent. Carotid, systemic and pulmo-cutaneous arches were normal; but the fifth arch branched off from the pulmo-cutaneous. It joined the systemic arch laterally and was large and open. Right and left sides were symmetrical. A ligamentum aortico-carotideum was present. The relation of the posterior petro-hyoideus muscles was as follows. The internal carotid artery slipped beneath, that is, dorsal to, the first petro-hyoid muscle, the systemic arch dorsal to the second, and the abnormally persistent arch dorsal to the third, thus preserving the regularity of arrangement which is lost when the fifth arch disappears during development.



Rana temporaria. Male. Heart and arterial arches. The left carotid, systemic, persistent fifth and pulmo-cutaneous arches are shown, with the ligament connecting the internal carotid artery and the systemic arch. The right arches are similar, and the first, second and third posterior petro-hyoid muscles have been drawn in position.

So far as I am aware the abnormality described has not been recorded on both sides of an adult frog. O'Donoghue¹ gave an account of a persistent fifth arch on the left side of a male, without reference to the musculature, and in his specimen a true ductus caroticus was present.

Abnormalities in the venous system are much more common, and among this group of a hundred frogs three exhibited persistent lateral abdominal or posterior cardinal veins.

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