

### Importation of the Dune Snail into Western Australia

WE have recently received from Mr. L. Glauert, Curator of the Public Museum, Perth (W. Australia) a number of shells of the Dune (or Pointed) Snail *Cochlicella acuta* (olim *barbara*). They were obtained by Mr. K. R. Norris in the neighbourhood of Freemantle, where they are abundantly found in gardens and open country and on sand hills. The home of this species is on the Mediterranean coasts and up the west coast of Europe to the British Isles and Denmark, and there is no doubt that its occurrence in Western Australia is due to its having been accidentally transported by human agency. The wide dispersal of certain species of land molluscs (for example, *Subulina octona*) by this means is familiar to many zoologists; but this instance is interesting from more than one point of view.

I have been engaged for some time in the study of the variation and distribution of *C. acuta*. This work is by no means concluded as yet; but it is possible to say this much concerning the distribution. *C. acuta* is primarily an inhabitant of coastal regions and is found typically on sand dunes, dune-pasture and turf cliff-tops. Here and there, however, it is found inland (for example, in France) and in Ireland it occurs practically all over the country. It is prone to form 'patchy' and short-lived colonies and has some habit or faculty which renders it liable to accidental transport<sup>1</sup>. I was at first inclined to attribute the formation of these colonies (in England at least) to transport by vehicles and certainly in one instance some specimens were taken off the mudguard of a car at Pulborough very many miles from the nearest colony. The position of some of these colonies, however, does not suggest that transport of this kind is universally responsible and it seems more likely that some colonies may be formed by individuals caught up on the coats of cattle or sheep. It occurred to me that *C. acuta* may have been transported in this fashion to Western Australia, as many of the colonies in south-east England are in downland situations of such a nature that individuals are liable to be accidentally picked up by sheep. In response to an inquiry, Mr. Glauert informs me that South Down sheep have been imported from England into Western Australia during the last few years, though it is not yet possible to decide how long the snail has been present in Western Australia and whether its arrival coincided with the importation of South Down sheep. The fact that at Freemantle it is found in gardens may suggest that it may have been imported in garden-produce. For reasons given in the next paragraph this does not seem very likely, though it is not entirely ruled out.

In its new home *C. acuta* is reported to be attacking garden plants and others of economic importance. In no part of its European or North African area, so far as I know, has this been noted. In the British Isles at least it does not seem to occur in gardens unless they happen to comprise part of the natural habitat, for example, dunes or dune pasture. I have, however, taken it myself on the walls of cliff-gardens on the French Riviera (for example, at Rochebonne, near Monaco). If indeed the Freemantle *acuta* was imported from south-east England, the occupation of gardens at Freemantle and the ravaging of garden plants seems to be another instance of the occupation of new habitats and the development of new habits often seen when an animal is introduced into a new area.

*P.S.* Since writing this letter I have been informed by Mr. R. F. Mills of the Ministry of Agriculture and Fisheries that sheep exported from Great Britain are kept for some time in a quarantine station in London where they are examined daily for scab, etc. It is not likely that snails would be overlooked in the course of such examination, so that the transport of *C. acuta* by sheep does not seem very probable. There remains, however, the possibility that the snail has been carried in the fodder of such exported animals.

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<sup>1</sup> Cf. Aubertin, Ellis and Robson, *Proc. Zool. Soc.*, London, 1931, p. 1039.

### Hot Spring Spiders

CONSIDERABLE interest attaches to a collection of North American desert Arachnida which have recently been sent to me by Mrs. Florence D. Wood, of New York. The collection, which was made in Powell, Wyoming, and certain localities in Montana, includes the scorpion *Uroctonus mordax*, the phalangid *Mitopus montanus* and the solpugid *Eremobates formicaria*, and a large number of spiders, some of which were captured at the Pipestone Hot Springs, near Whitehall, Montana.

These hot spring spiders are eight adult females and one young specimen of the not uncommon American species *Pardosa sternalis*. All are very brightly pigmented and well developed, and their occurrence, in the words of their captor, "running on water too hot to be borne by the hand", is worthy of record. Spiders on cold water are common enough, but spiders on hot water are something of a rarity.

The finding of the Solpugidæ is also unexpected. They came from western Montana, "which is none too warm in summer". They were not near the hot springs, and this locality seems to be a new record for the genus.

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### Cosmic Rays and Lightning

IN order to explain the curious behaviour of lightning flashes the possibility should be kept in mind of a connexion between a lightning discharge and the cosmic rays. When penetrating particles from cosmic rays move through the atmosphere—in this case through electrically 'loaded' clouds—they are ionising the air, making conducting paths for the lightning. The twisted or irregular shapes of lightning flashes may find a natural explanation, if we think of a discharge path following the variable network of ion-tracks, such as are assumed to be present in the air at any moment, caused by nuclear disintegration of atoms and other processes in conjunction with the cosmic rays, causing emission of protons, neutrons and negative or positive electrons.

It may be suggested that even an ordinary spark discharge from a high-voltage apparatus in free air will be of somewhat different appearance, when produced on the surface of the earth and when in a deep mine, where no ionising agent is present.

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Stockholm, 7. Oct. 13.