Water Content of Medusæ; Sexuality in a Planarian

IN recent numbers of NATURE there have appeared two communications which seem to call for comment. In the issue of August 22, Lowndes[1] discusses the question of the water content of medusæ, determining that of *Aurelia aurita* to be 96·56 per cent in sea water of 3·3 per cent salinity. A few years ago I became interested in the same question and also determined the water content of *Aurelia aurita*, finding 96 per cent water in specimens from sea water of 3·2 per cent salinity[2]. Later, I determined the water content of four other species of medusæ, all hydromedusæ, finding 96·5–97 per cent water in specimens taken from sea water of 3·0 per cent salinity[3]. In the first of these papers I reviewed the available data on the subject[4]; these show that in sea water of more than 3 per cent salinity, the water content of medusæ ranges from 94 to 96·5 per cent but that in brackish water of less than 2 per cent salinity, the water content of *Aurelia aurita* may rise to 98 per cent. From these facts it may be inferred that the water content of freshwater medusæ must be very high, and this has recently been found to be the case by Dunham[5], who reports 99–99·3 per cent water in Craspedacusta, thus confirming an old statement by Cremer[6].

IN NATURE of September 19, Goldsmith[7] comments on sexuality in the planarian *Dugesia tigrina* (Girard) 1850 (old name, *Planaria maculata* Leidy). This is the most common freshwater planarian in the United States, occurring throughout the country in ponds, lakes, and streams, and presenting many local and geographic variations. It also occurs, as first noted by Curtis[8], in sexual and asexual strains. In 1937 Kenk attempted to induce sexuality in the sexual forms by various environmental factors, but was unsuccessful[9]. From field data I had noticed that the sexual strain is commonly found in running water or along shores subject to wave action, whereas the asexual strain appears to be confined to ponds and still waters. I therefore suggested[10] that possibly moving water is a factor in the sexual development of this planarian, but shortly after I had published this suggestion I found (unpublished) that this explanation is untenable as regards the sexual strain, and soon Kenk[11] published to the same effect, showing that members of the sexual strain reared throughout life in dishes in the laboratory may become sexual and lay viable capsules. The point raised by Goldsmith had, therefore, already been settled by Kenk. The possibility still remains that there is some relation between permanent asexuality and still water, but this now seems to be unlikely.

The theory of Kenk, which appears to be accepted by Goldsmith, that this planarian has an inherent sexual rhythm is, however, erroneous. In Nature, these worms become sexually mature in early spring and lay cocoons for about three months thereafter. The reproductive system then retrogresses, the copulatory apparatus disappears, and ordinarily there is no further sexual reproduction until the following spring. This cycle is not, however, inherent but is controlled by temperature, as I have shown[12]. The development of the reproductive system, especially of the copulatory apparatus, follows in a few days when the worms are put at room temperature after a sojourn (of two weeks or even less) at a cold temperature (15° C. or below). Stocks brought in from Nature at any time after temperatures have fallen in the autumn and set at room temperature begin to develop sexually in one or two days and start to lay cocoons within a week; although if left outdoors they would not have reached sexual maturity until the following April. Only worms of mature size can be induced to mature sexually by temperature change, and some time must elapse (about three or four months) before sexuality can again be induced in the same individual by manipulation of the temperature.

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[1] Lowndes, A. G., NATURE, **150**, 234 (1942).
[2] Hyman, L. H., *Science*, **87**, 166 (1938).
[3] Hyman, L. H., *Biol. Bull.*, **79**, 282 (1940).
[4] The important paper of Koizumi, T., and Hosai, K., *Science Rep. Tohoku Imper. Univ.*, Ser. 4 (Biol.), **10**, 709 (1936) was unfortunately omitted from this bibliography. They found the water content of Aequorea, Cyanea, and Dactylometra to be 96·4 per cent in water of 3·42 per cent salinity.
[5] Dunham, D. W., *Amer. Midland Natural.*, **28**, 526 (1942).
[6] Cremer, Max, *Sitzungsber. Gesell. Morph. Physiol. München*, **22**, 41 (1906). The statement of Cremer is as follows: "Wenn man bedenkt dass die grösseren Exemplare dieser Tiere kaum einen Durchmesser von 1 cm. besitzen und dass ca. 99 per cent des Körpers dieser Quallen überhaupt aus Wasser bestehen. . ." No grounds for the statement are given.
[7] Goldsmith, E. D., NATURE, **150**, 351 (1942).
[8] Curtis, W. C., *Proc. Boston Soc. Nat. Hist.*, **30**, 515 (1902).
[9] Kenk, R., *Biol. Bull.*, **73**, 280 (1937).
[10] Hyman, L. H., *Trans. Amer. Micro. Soc.*, **58**, 271 (1939).
[11] Kenk, R., *Amer. Natural.*, **74**, 470 (1940).
[12] Hymen, L. H., *Anat. Rec.*, **81** (Suppl.), 108 (1941).

Seed Dispersal by Human Activity

IN a recent paper[1] dealing with weed problems, Prof. E. J. Salisbury has directed attention to accidental carriage and distribution of seeds by human activity, and instances that clothes can be one of a number of means of distribution.

In recent research work on tussock grassland in North Canterbury, New Zealand, with particular reference to the distribution of the nassella tussock (*Nassella trichotoma* (Nees) Hack.), it was demonstrated that clothing can be an important means of seed distribution. The 'cuffs' of a pair of trousers yielded some 17 gm. of seeds and fruits (after five days' field work), the mixture being composed of the seeds and fruits of 33 species of plants, 19 species of grasses, and the remainder of other weeds. Several pairs of socks yielded, among other germinules, more than three hundred 'seeds' of nassella tussock, a troublesome plant rapidly becoming locally dominant in North Canterbury.

The relatively large amount of seeds and fruits present, the number of species and genera represented and the quantity of each, indicated the potentialities of this little-considered means in the distribution of plants, both noxious and beneficial.

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[1] Salisbury, E. J., NATURE, **149**, 594 (1942).