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POPULAR AND PRACTICAL ENTOMOLOGY.

FURTHER REMARKS ON COLLEMBOLA.

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(Continued from page 245.)

and more grateful air, come out in constantly increasing multitudes.

Experiments showed that a temperature of zero Fahrenheit killed *Achorutes socialis* in less than an hour, while at 5° F. they survived indefinitely. But although 5° F. seems to do them no harm, they never expose themselves voluntarily to that degree of cold. The lowest temperature at which I have seen them on the surface was 18° F., and that was very exceptional. As a rule they do not appear until the thermometer approaches 25° F., and from 30° F. upwards they reach their greatest abundance. Their reaction to a rising temperature is rapid. Even when the snow lies two feet deep or more, they are out within an hour or so after the milder weather begins, and after 24 hours of thaw they may be looked for in large numbers. No marked difference in response to temperature changes can be noticed between the various snow frequenters, and usually three or four different species can be found at the same time. In this district *Achorutes socialis* is generally in excess of all the others, but occasionally, for some reason or another, the mild weather fails to attract it, and *Isotoma nigra* or *I. macnamarai* may be the predominant species on the snow.

Outside of temperature, the other weather conditions have little influence on them. Provided the day is mild, they come out as readily in wind, pouring rain or heavy snow as in calm sunshine. During a snow-storm it is interesting to watch how they keep constantly climbing to the surface in order to avoid being buried by the falling flakes.

It is quite possible that sometimes the insects reach the surface by coming up straight through the snow. Their integument is far too delicate for any forceful burrowing, but snow lying loosely as it falls, always has interstices between its particles amply wide enough for the free passage of these minute creatures. This mode of emergence, however, cannot very often be used in mid-winter, for generally the snow stratum, when it attains any thickness, includes one or more layers of crust that are quite impervious to the soft-bodied springtail. Nevertheless, another exit is open to them. Around every stalk of grass, brushwood stem, tree trunk or other object projecting through the snow, there is always a clear space, no matter how deep the snow, resulting partly from the shrinkage of the snow as it settles, and partly from the radiation of absorbed heat by the object. It is from these sally-ports that the snow-flea hosts principally issue.

* We regret the awkward division of Mr. Macnamara's article. Through an unfortunate oversight the concluding sentence of the first part in the November number was left unfinished.