ACAROLOGY AND ITS PRACTICAL IMPORTANCE

Introduction

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The Third International Congress of Acarology is resuming the work of the previous meetings of acarologists in Fort Collins in 1963 and in Nottingham in 1967. Acarology is a young science which has, according to Bregetova (1966), lagged behind entomology by about 150 years. However, during these last few years acarology has been rapidly making up for lost time. As a science which should develop progressively and prove that it is greatly contributing not only to theory but to practice as well, it should necessarily throw light upon the scope and importance of its object. Thus it was not by chance that at the First Congress G. W. Wharton in his presidential address recapitulated the development of acarology. Up to 1963 a total of 17,500 species of mites and ticks had been recorded. The number of species then undescribed was assessed to be from half a million to one million.

At the Second Congress its President T. E. Hughes outlined the new trends which should be followed in acarological research.

After consulting my fellow acarologists as to what should be the subject of my introductory paper to the Third Congress, I arrived at the conclusion that a survey of the practical importance of acarology would be quite suitable. A new scientific field carries weight only if its results have practical value. The development of science is usually subsidized, provided that the sum invested will be reflected in national economy.

The Acari constitute an animal group distributed from Polar regions to highest altitudes and with its very different ecology it has a prospect of playing significant role in national economy. The mites form a very large and important component of fauna whose adverse economic effects have been overlooked until recently.

A notable feature which is of great practical consequence in mites, is their size. In many groups, especially in parasitic or phytophagous ones, they are tiny organisms which can be compared with spores of some microscopic fungi, with some protozoans, yeast-plants or even with large bacteria. Their size ranges from 100 to 500 μm. This fact characterizes their possible influence upon animals and plants and points to specific possibilities of distribution unknown in other animals.

Another peculiarity of mites, especially of some parasitic and phytophagous species, is their reproductive ability. For example, it is not exceptional to find up to 70,000 specimens of the species Dermatophagoides gallinae or D. birundinis in a
single nest of some bird species. The data on the number of eggs laid by a single female tick (according to species up to 17,000 eggs may be produced) are common knowledge. Fieber (1923) reports Gerlach's assessment of fertility of scab mites of the genera Psoroptes and Chorioptes. If one female lays 15 eggs only, in 15 days there will be 10 females and 5 males. In 3 months there will be one and a half million mites! No wonder that for example on a scabby chamois 600-1,000 scab mites of the genus Sarcoptes have been found per 1 cm² of skin. Up to several tens of thousands of mites of the family Acaridae have been found per 1 kg of stored products. In cases of heavy infestations, from 1,000 to 3,000 specimens of the species Tyrolichus casei may be found per 1 cm² of cheese rind. They destroy the cheese surface and the resulting powder contains large numbers of faeces, egg membranes, dead mites and exuviae. In 1 g samples of house-dust collected in Japan Oshima Shiro (1970) found an average number of 1,045 mites belonging to 40 species.

Being one of the foremost animal groups as regards numerosity, mites and ticks play an important role in biogeocenoses (ecosystems) of separate biomes of the Earth.

From tundra soils, the vegetation of temperate zone and from the Tropics to the Antarctic region they form an important component of the edaphic fauna. Their numbers and varied ecological relationships - from saprophagia to parasitism - condition the communities which markedly influence the processes in soil. During recent years the studies on soil mites have been intensified. Apart from clearly theoretical aspects it has been ascertained that mites play a decisive role in humification; studies have shown that the forms of practical importance are mostly common and widespread species with a large number of specimens; 2. mites living in soil may be vectors or intermediate hosts of different pathogenous agents (from viruses to helminths).

Soil mites are typical representatives of a soil microfauna, inhabiting soil pores and other minute soil spaces. In contrast to the macrofauna they are incapable of active penetration of the soil. They inhabit natural soil spaces filled with air (primarily in upper layers). Together with the springtails (Collembola) they are the most important representatives of the aerobiotic microfauna. In grassland (meadows, pastures etc.) of Central Europe the number of mites is said to be between 17,000 and 270,000 per 1 m² (average number 100,000). In fields their numbers range from 10,000 to 90,000 per 1 m² (average number 35,000) (Tischler, 1965). Their biomass in meadow soils is reported to be 1-2 g m⁻². In forest habitats their representation is about 2,5 times that of grassland and more than 20 times that of field habitats (Gatilova, 1964). The soil mites are mainly phytophagous, fungivorous and saprophagous forms, predators and parasites. Of exceptional importance are the oribatid mites which participate markedly in the circulation of substances in soil. They triturate mechanically substances, which would otherwise be inaccessible to microbes, into increasingly smaller particles and accumulate them in their faeces. For example, according to Margowsky and Prusinkiewicz (1955) in a riverbank meadow 78,400 mites/m² processed 107.6 cm³ of organic substances per year. The mites of different groups, together with other tiny arthropods, control the growth and deve-