

SEKCJA I. BIOLOGIA I ROLA EPIDEMIOLOGICZNA STAWONOGÓW
W ŚRODOWISKACH NA RÓŻNYM ETAPIE ANTROPOGENIZACJI

A. *IXODIDES*, PASOŻYTY DROBNYCH GRYZONI, *NEMATOCERA*

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THE BIOLOGY AND EPIDEMIOLOGICAL ROLE OF ARTHROPODS
IN THE ENVIRONMENTS AT VARIOUS STAGES
OF ANTHROPOGENIZATION

STAGE OF INVESTIGATIONS ON *IXODIDES*, PARASITES OF RODENTS
AND *NEMATOCERA*

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Nature — the natural environment, urban agglomerations in particular, and dwellings themselves are now under great pressure from anthropogenic factors, the intensity and range of which are increasing with time. These factors also have a tremendous influence on the occurrence and development of wild and synantropic biocenoses which often constitute serious medical danger in such changed environments. Against the background of these phenomena, it is understandable that the present, V Symposium, similar to the last two, bears the title "Parasitic arthropods under anthropopressure" and our section once more being devoted to "the biology and epidemiological role of arthropods in environments at different stages of anthropogenization".

The subjects of the submissions covering *Ixodides*, the parasites of small mammals, and *Nematocera*, will be discussed mainly basing on Polish and other European papers published in the period between the last two Symposia.

Studying the biology and epidemiology of ticks of the *Ixodidae* family there is an increasing frequency of information on the occupying of biotopes under strong anthropogenic pressure. Authors engaged on this problem include Černý and Daniel from Czechoslovakia. They frequently submitted information on the incidence in urban parks and villa

districts of such large towns as Prague, of not only *Ixodes ricinus*, but also *Neotrombicula autumnalis* [16, 59]. At the present Symposium the same authors have signalized tick infestation in various recultivated refuse spoil banks and forests in the area of the outcrop coal basin at Most, NW Bohemia. In the opinion of Černý and Daniel, in some parts of these spoil banks the numbers of *I. ricinus* were greater than in the nearby forest. The presence of the tick *I. ricinus* was also noted in an afforested area in close proximity to a new housing estate in Gdańsk [119].

Manilla [73], on the other hand, observed that in the region of Rieti (Italy) *I. ricinus* occurred in large numbers on cats and in houses where there was a suitable microclimate, and were active throughout the whole of the winter. The author emphasizes that the adapting of *I. ricinus* to new conditions, in the immediate proximity of man, constitutes a serious threat to his health.

The relatively dry and warm climate characteristic of Central European towns thanks to arthropogenization, creates suitable conditions for many species of thermo- and xerophilic arthropods. As an example, mention can be made of the finding of the brown dog tick, *Rhipicephalus sanguineus* in Warsaw. Szymański [114] submitted information on this matter in 1979 and in his paper for the present Symposium, Żukowski describes a further two cases of this tick being found on dogs and in homes in Warsaw. Recently, Černý [15] has also written about the importing into Czechoslovakia on a dog of *R. sanguineus*, as well as the finding of these arthropods in the home and on the body of the dog's owner. The introducing of *R. sanguineus* into homes, increases the epidemiological threat. This species is known as a vector of various pathogens among others to man [43, 79]. Cases are even known of boutonneuse fever (caused by *Rickettsia conorii*) being transmitted by *R. sanguineus* in children aged from 2 to 10 years, who were proved to have been in contact with dogs [79].

As is known, anthropogenic pressure leads to forced changes in the natural environment. Among others, the indigenous arthropods must also submit to this. Considering these processes, Gilot and Pautou [30] proposed to divide *Ixodidae* ticks into 4 ecological groups. Thus *Dermacentor reticulatus*, for example, belongs to the species which occur in agricultural, suburban and periurban areas. The long-term research conducted by Daniel, Černý and Szymański on this tick in Poland and Czechoslovakia, and which is the subject of paper at the present Symposium, indicates that *D. reticulatus* is being driven back on poorly- or un-cultivated areas. Thus, the occurrence of the ticks depends on direct human activities. It is the opinion of the authors that this may serve as the basis to forecast the direction in which this tick species will spread under anthropopressure.

Over the past 5 years a relatively large number of papers has been published on the subject of the incidence of arboviruses in Europe, also papers which point out the part played by ticks and mosquitoes in the transmission of these pathogens [2, 18, 27, 38 - 41, 61, 67, 72, 74, 75, 77, 82, 83, 85, 117]. A detailed analysis of these findings cannot be given here. At the Symposium there were submitted two papers on this subject.

Summing up the viruses transmitted by arthropods, which were noted in Czechoslovakia, Grešíková states that so far 9 species have been isolated there: — 3 (Sinbis, West Nile and tick-borne encephalitis — TBE) of the *Togaviridae* family; 5 (Ťahyňa, Čalovo, Lednice, Uukuniemi and haemorrhagic fever with renal syndrome — HFRS) of the *Bunyaviridae* family; and 1 (Tribeč virus) of the *Reoviridae* family. The author also indicates that up to the present moment the cases of sickness in humans in Czechoslovakia have been caused only by the TBE and HFRS viruses. The latter was isolated there, in the nature from the lungs of small rodents only [41]. — It is now thought that insectivores, cats and mites should also be taken into account as animals spreading the HFRS virus [42, 89].

Savickij discusses the role of *I. ricinus* and *D. reticulatus* in the transmission of arthropod-borne diseases, in Byelorussia. He indicates that in that region, only *I. ricinus* participates in the transmission of the TBE virus. This author also states that Uukuniemi virus was isolated there from *I. ricinus*, and that this tick is able to transstadial and transovarial transmission of the Uukuniemi virus. — It should also be mentioned that Lomonosov et al. [69] isolated the Tribeč virus from *I. ricinus* taken from cattle in Byelorussia.

Studies on the occurrence of the TBE virus were also carried out at Gdańsk, where 7 strains were isolated from the brains of small mammals — 3 in *Apodemus flavicollis* and in *A. agrarius* and 1 in *Sorex araneus*. No virus was found in the *I. ricinus* taken from plants [10, 119].

In his paper submitted at the present Symposium, Żukowski relates cases of *Argas (A.) reflexus* being found on humans in Wrocław (the first case was described by Grzywiński [44] in 1970). At present, both adults and children, including babies, have been stung and two cases of anaphylactic shock required hospitalisation. — Miadonna et al. [76] observed similar intensification of symptoms after stings by *A. (A) reflexus*, in Italy. Luca and Ungureanu from Rumania also reported in their paper skin reactions caused by tick stings. Unfortunately, the authors do not give the species of tick or host referred to. Deryło, on the other hand, examined the histopathological changes in the skin of rabbits, following stings by the female *Hyalomma dromedarii asiaticum* and *Rhipicephalus* sp. larvae.

In recent years, some authors have shown interest in pheromones produced by representatives of *Ixodidae* and *Argasidae*, also the function played by these compounds in the exact behaviour of the arthropod, with the intention of its utilisation in control [33 - 35, 56, 97]. The application of both natural and synthetic pheromones necessitates knowledge of the reactions of the arthropod and the testing of suitable agents. In this field, Dusbábek submitted to the Symposium some interesting results of observations on communication by means of pheromones giving rise to an aggregation score of wild and laboratory reared populations of *Argas* (P.) *persicus*. Only laboratory-bred populations were found to be suitable for testing the pheromones.

Another paper submitted to the Symposium was one by Żukowski concerning experimental studies on the effect of *Escherichia coli* on the organism of the ticks *Dermacentor reticulatus* and *Hyalomma dromedarii*. As the author observed, in ticks infected by capillary-feeding method with a suspension containing 4×10^8 *E. coli* cells per 1 cm³ these bacteria survived for up to 48 hours, none being present in the body cavity fluid and did not have visible effect on the organism of the tick.

During the intersymposial period ectoparasites of small mammals were the subject of either comprehensive studies, i.e. all three orders: *Acarina*, *Anoplura* and *Siphonaptera* on one or several species of hosts [7, 12, 29, 45, 50 - 53, 81, 118, 123] or selectively, meaning referring to one order of parasites. This relates, in particular to the fleas — *Siphonaptera* [8, 21 - 25, 95]. Basing on the mathematical analysis of occurrence of fleas, Kiefer et al. [57] carried out the zoogeographic regionalization of Mongolia. The WHO [37] devoted a separate paper to fleas, their biology and control. Stanjukovič [98] states that he found the tropical rat flea — *Xenopsylla cheopis* in nest of *Microtus arvalis* in Leningrad, where it was even the dominant species. It is worth mentioning that the *X. cheopis* species was also found on rats in the Gdynia area in the 1950s [94, 120, 121]. Because of their well-known role in the distributing of the plague, rat fleas continue to arouse considerable interest [26, 28, 68, 118, 122]. At the present Symposium, the subject of rat fleas was covered by Kruminis-Łozowska in her paper. Based on the material collected from Gdynia and Gdańsk over the past 6 years, the indices of rat infestation calculated by the author remained at a low level: the flea index did not exceed 0.72. The collection of fleas was also not greatly varied as only three species were noted: *Nosopsyllus fasciatus*, *Ctenophthalmus agyrtes* and *Leptopsylla segnis*.

In his paper, on the other hand, Kohn concentrates attention on the influence of large towns on the specific composition of fleas parasitizing small mammals. Taking the České Budějovice (South Bohemia) as an example, the author studied the habitat depending variability of flea

species compositions and demonstrated their change with the shifting from open country towards the town centre.

It is known that small terrestrial mammals are mainly parasitized by the larvae, and birds are the main hosts of the nymphs of *I. ricinus*. However studies in Czechoslovakia showed that in years when the bird population was low, and especially where their habitat had been altered by man, the *I. ricinus* nymphs infestation on small mammals increased [71].

Mites parasitizing on small mammals have also aroused considerable interest in recent years. It is worth while mentioning the work carried out by Haitlinger, who studied these arthropods in the sub-Alpine zone of the Polish Tatras, or described new species as well as those rare to the fauna of our country [46 - 49]. Molnos [78] reported the finding of new species of mites in Hungary and Kohn [58] those found in Czechoslovakia. Żukowski [126], on the other hand, described the mites of some species of small mammals from Yugoslavia. Kojumdžieva [60] wrote a paper on mites of the *Gamasina* group on two species of rodents of the *Muridae* family: *Ap. sylvaticus* and *Ap. flavicollis*, in Bulgaria. Among the c. 40 species, the most numerous on both hosts was *Laelaps agilis*, which constituted approximately 80% of the collection. Mites from the same group of *Gamasina* are discussed by Pruszyńska at the present Symposium. In the material taken from small mammals caught in the forest surrounding the Gdańsk—Sopot—Gdynia area, the author distinguished 37 species — the majority (61.9%) belonging to the *Laelaptidae*.

The literature contains increasingly frequent reports of the infestation of small laboratory animals by mites. In Poland, for example *Ornithonyssus bacoti* occurs frequently [54, 115, 127]. Fagasiński now reports the symptomatic infestation of laboratory mice with *Tarsonemoides noxius*.

Nematocera are poorly represented at the present Symposium. Only one paper was submitted — by Szadziewski, who of the biting midges, *Ceratopogonidae*, discusses the occurrence of *Forcipomyia velox* on amphibians in Poland. This species is rarely caught and transmits filariasis to frogs. Mention should, however, be made of the fact that during the period between the last two Symposia *Ceratopogonidae* were studied fairly intensively. Several Szadziewski's papers appeared in Poland on the fauna of Algerian biting midges [104 - 106, 108, 109], also reviews on selected subgenera [111, 113]. Among other things, Szadziewski [111] described a new species which he named *Dasyhelea skierskae* after the late Barbara Skierska Ph.D., D.Sc. The same author also carried out a re-description of several species of biting midges from Egypt [110] and proposed new synonyms for 4 species of the *Culicoides* genus [107].

Whilst conducting ecological-faunistic studies on *Ceratopogonidae* in various regions in Poland, he found among the *Culicoides* many species new to Polish fauna [103, 112]. Biliński [11] also reported 5 species of biting midges of the *Culicoides* new to Poland, which he found in the eastern part of the country. I would like to mention here that as from 1982 the Medical Entomology Laboratory of the Institute of Maritime and Tropical Medicine in Gdynia has conducted successive studies on the occurrence of biting midges in the region of Lake Żarnowieckie, (North Poland). So far, about 2,000 specimens have been collected, these including 26 species of the *Culicoides* genus. Of the foreign publications I would like to mention that of Lvov [70] who stated that in the southern part of the Soviet Union over 30 arboviruses were isolated from *Ceratopogonidae*, the viruses belonging to the *Togoviridae*, *Rhabdoviridae* and *Bunyaviridae* families and also embracing species of viruses of epidemiological importance. Concluding the discussion on studies connected with biting midges, mention must be made of the fact that the successive — 5th International Symposium on *Ceratopogonidae* took place in Strasbourg in 1982. Among the 25 specialists from 7 countries Dr. R. Sza-dziewski was an active participant on behalf of Poland [62].

Although no papers on mosquitoes — *Culicidae* were submitted at the present Symposium, numerous papers have been published on the subject of these hematophagous over the past few years. For example, in Poland, Lachmajer [65] discussed the trophic relationships of *Anopheles maculipennis* complex and *An. claviger* females in the Gdańsk region; Lachmajer and Antonowicz [66] wrote up the blood feeding of starving and glucose-fed female mosquitoes of the genera: *Anopheles*, *Aedes* and *Culex*. Apart from this, Burkiewicz and Grablis [14] submitted 17 species of mosquitoes from the terrain of Świnoujście port (North-West Poland). At present, the Medical Entomology Laboratory of the Institute of Maritime and Tropical Medicine in Gdynia is conducting research on the fauna of mosquitoes in the Lake Żarnowieckie region. So far, about 19,000 specimens of mosquitoes from 27 species have been collected. They were found to include several specimens of larvae and imagines of *Aedes rossicus* — as species previously found only twice in Poland, namely by Skierska [92] and Skierska and Sza-dziewska [93].

Apart from Poland, during the past 5 years, attention has been paid in studies of the *Culicidae*, on feeding preference [80, 116, 124], cytogenetics [17, 84, 88, 99, 100 - 102, 125] and other elements of biology, including ecology and epidemiology [1, 3 - 6, 9, 13, 31, 32, 55, 63, 64, 86, 87, 90, 91, 96].

Doby and Guiguen [20] described an interesting case of malaria in two people (one fatal) living next to the international airport in Paris.

The authors are of the opinion that the vectors were mosquitoes imported by air.

As mosquitoes transmit diseases and are highly onerous during periods when they appear in large numbers, they constitute an important group of insects requiring successive research and control of occurrence of particular species in various regions of the country. What may constitute a disturbing fact is that in Poland, apart from the Institute of Maritime and Tropical Medicine in Gdynia and the Polish Academy of Sciences' Institute of Zoology in Warsaw, no-one else is studying these hematophagous.

Dąbrowska-Prot [19] already pointed out the decline, in Poland, of this important field of research (one which has its traditions), also the fact that specialists were either changing over to other problems or retiring from active research, at the XXXVII Congress of the Polish Entomology Society at Cracow in 1980. I would therefore like to appeal for this field of research to be propagated among the young biologists and also that specialists be trained.

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BIOLOGIA I ROLA EPIDEMIOLOGICZNA STAWONOGÓW W ŚRODOWISKACH
NA RÓŻNYM ETAPIE ANTROPOGENIZACJI

IXODIDES, PASOŻYTY DROBNYCH GRYZONI, NEMATOCERA

Z. WEGNER

Problematykę nadesłanych doniesień omówiono na tle prac akaroentomologicznych, przede wszystkim krajowych i europejskich, opublikowanych w okresie międzysympozjalnym.

W pierwszej kolejności zwrócono uwagę na nasilającą się z roku na rok presję czynników antropogenicznych wywierających współcześnie kolosalny wpływ również na występowanie i rozwój wielu biocenoz dzikich i synantropijnych — m. in. na przedstawicieli *Ixodides* — stanowiących niekiedy, w tak zmienionych warunkach, poważne zagrożenie z punktu widzenia medycyny i epidemiologii.

Dokonano krótkiego przeglądu dotychczasowych danych na temat izolowania z kleszczy i komarów szczepów arbowirusów i występowania poszczególnych gatunków tych patogenów na terenie Czechosłowacji i innych krajów Europy Środkowej.

Wspomniano też o roli feromonów wydzielanych przez *Ixodidae* i *Argasidae*, a także o eksperymentalnych badaniach nad wpływem chorobotwórczych bakterii na organizm kleszczy.

Stosunkowo wiele uwagi poświęcono pasożytom zewnętrznym drobnych ssaków, a szczególnie rzędowi *Siphonaptera* i *Acarina*.

Omówiono również aktualny stan badań nad hematofagicznymi kuczmanami (*Ceratopogonidae*) i komarami (*Culicidae*) w Polsce. Zwrócono uwagę na niepokojące zjawisko zamierania w naszym kraju tak ważnego i posiadającego swoje tradycje kierunku badań jaki stanowi rodzina *Culicidae*. Zaapelowano więc o propagowanie go wśród młodych biologów i kształcenie specjalistów — komarologów.