

1967



Outline of Iraqi Parasitology

by *Wd. Eichler, Kleinmachnow, GDR*

A short visit in 1965 and a longer stay in 1966 as a visiting professor at Baghdad University gave me the opportunity to obtain some information concerning the parasitological situation in the Republic of Iraq. This information together with some recent publications enabled me to present the following sketch of the main problems in Iraqi parasitology. This would not have been possible without the kindness of my friends and colleagues in Baghdad. I mention especially *Dr. Kurtpinar*, *Dr. Abbas Najim*, *Dr. Al-Dabbagh*, *Dr. Ibrahim* and *Dr. El-Gindy*. But thanks to all that have not been listed here.

Concerning the terminology of parasitoses the system of *Skrjabin* and *Kollán* in the modified form of *Eichler* [9] has been followed.

A. GENERAL REMARKS

1. Introduction

The Republic of Iraq covers 301982 km². It is ruled by the rivers Euphrates and Tigris. The major part of the country is a wide plain. Only the very northern parts are mountainous. In the western parts there are wide steppe and desert regions, only interrupted by dune-like ridges of hills. The united Euphrates and Tigris form the Shat-el-Arab. It flows through a swampy region to the Persian Gulf. The population (amounting to 3.67 millions in 1942) is concentrated in the neighbourhood of the great rivers and the mountain regions in the north. The climate is hot and dry (continental climate) in the centre of the country. On the southern border at the Persian Gulf it is wet and sultry; on the northern border in the mountains of Kurdistan the winters are cold and are accompanied by heavy snowfalls.

2. Laboratories

Medical parasitology is represented by the Department of Parasitology at the Medical College of Baghdad University. Its head is Prof. *Al-Saffar*. Eminent work is also done by Prof. *Al-Dabbagh* here.

The Iraqi Ministry of Health maintains the "Institute of Endemic Diseases" in Alwiya, Baghdad, which practically equals an institute of tropical medicine. It has three divisions, i. e. the Malaria Division, the Bilharziasis Division, and the Division of Medically Important Insects. Its director is Dr. *Mahmoud Ibrahim*. The division of medically important insects is concerned among others with fly problems.

Mosul University has a chair of parasitology at the medical faculty.

Veterinary parasitology falls to the share of the Department of Parasitology at the Veterinary College of Baghdad University at Abu Ghraib. Its founder and head to 1965 was Prof. *Kurtpinar*, followed in 1966 by Prof. *K. Mirza*.

Veterinary parasitology work is also done by the FAO staff in the State Veterinary Laboratories, situated at Abu Ghraib.

Besides, some scientists of the College of Sciences and of the Biological Research Institute of the Supreme Council of Scientific Research are engaged with parasitological problems. Prof. *Abbas T. Najim* can be considered the pioneer of parasitological research in Iraq (see also bibliography).

3. Publishing activities

It can be said that there is one Iraqi parasitological periodical, the "*Bulletin of endemic diseases*" – edited by the "Institute of Endemic Diseases" of the Ministry of Health at Alwiya, Baghdad – since this journal deals with parasitological problems mainly. But the publishing activities in Iraqi parasitology are not low, every year a lot of articles are published in other journals, especially European (British) or American periodicals.

Regarding veterinary parasitology the work of *Leiper* [19] is a very useful compilation. Based on it, the paper of *Eichler* [10] contains a preliminary list of found or presumed parasites of Iraqi domestic animals during his stay at Baghdad Veterinary College.

The Directorate General of Animal Resources and Veterinary Services in the Ministry of Agriculture edits a fortnightly "*Veterinary Bulletin*" with statistical data on important livestock diseases. In this periodical the diseases are differentiated, but not the hosts.

B. MEDICAL PARASITISMS

4. Malaria

Malaria is an old problem in Iraq, and from ancient times connected especially with the Basra region. The main Iraqi vector mosquito, *Anopheles stephensi*, was the species which killed king *Alexander the Great*. He was planning a great expedition to solve the problem of a sea way from Babylonia to Egypt. For this purpose he concentrated many workers in the lower Iraq to build basins for ships and to build canals. These measures resulted in an explosive malaria epidemic which killed *Alexander*. Probably *Anopheles stephensi* was the vector (*Gabriel* [17]).

Even nowadays malaria is a serious problem in Iraq. The official malaria eradication program began in 1957 and was supported by the UN and the WHO. The main vectors are the following *Anopheles* species:

- A) In the Northern Region: *A. superpictus*, *A. sacharovi*, and partly also *A. "maculipennis"*.
- B) In the Central Region: *Anopheles stephensi stephensi*, *A. superpictus*.
- C) In the Southern Region (except some oases): *A. stephensi stephensi*.
- D) In some oases in the South: *A. sergenti* and *A. fluviatilis*.

In 1958 there were about 11,000 cases of malaria in the Southern Region and about 14,000 in the Central Region Area. The eradication started very well and in Central Iraq remained only 1,373 cases in 1964 and 269 in 1965. In Southern Iraq there had

been an endemy in 1963 with 4,118 cases, but in 1965 there were only 782 cases. Probably 1966 will be the last DDT-year for Central and Southern Iraq. In the North less has been achieved so far, probably because of the troubles there which prevented planned eradication work.

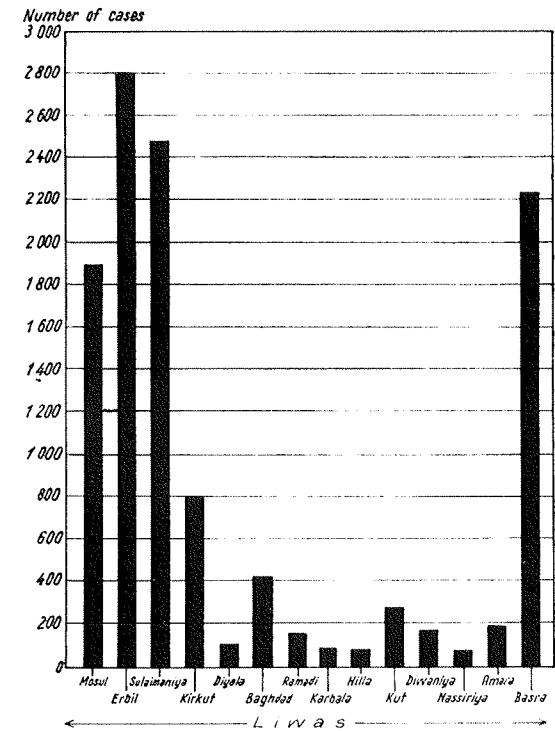


Fig. 1. Liwas distribution of malaria in Iraq in 1964 (cf. fig. 2). After G. T. Ossi in anonymous report [5].

In a 1942 review [4] malaria tropica was said to be prevalent in Iraq, but this would hold only for the southern region. At present certainly *Plasmodium vivax* is prevalent. *Plasmodium malariae* is very rare. *Plasmodium ovale* does not occur. The data shown in fig. 1 present only the absolute numbers of malaria cases. Nevertheless they may be useful for general information.

5. Leishmanioses

The main *Phlebotomus* species in the Iraq is *Ph. papatasi*. *Leishmania tropica* is very common. Dogs are not confirmed as reservoirs. Kala-Azar also presents a serious problem. In children's hospitals there are always some cases of visceral leishmaniosis. Especially outside of Baghdad Kala-Azar is difficult to diagnose. But since 1954 the occurrence of *Leishmania donovani* has been

confirmed in Baghdad. The reservoir host is still unknown. Dogs have not been found infected.

6. Toxoplasmosis

Najim and *Al-Saffar* [23] did some research work on toxoplasmosis in Iraq in testing school children with toxoplasmin and got positive results in about 5 percent of

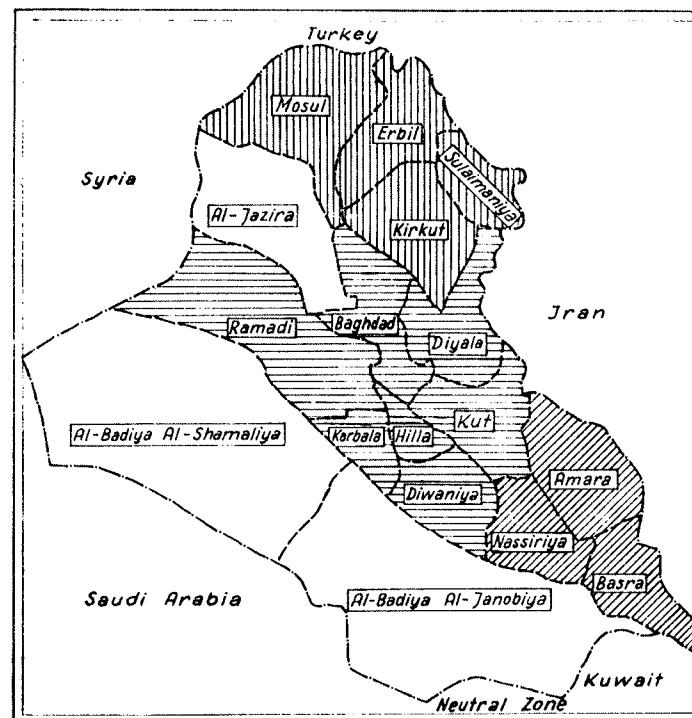


Fig. 2. Administrative map of Iraq (for comparison with fig. 1). After G. T. Ossi in anonymous report [5].

the 7 to 12 year-old children. This percentage resembles condition in Central Europe according to my own experiences (*Eichler*, unpublished work on toxoplasmosis). That mentally defective children showed a higher positive percentage in the toxoplasmin test (*Al-Saffar* and *Najim* [2]) also corresponds with the data revealed by investigators in Central Europe.

7. Pneumocystosis

The presence of *Pneumocystis carinii* was supposed by *Najim*, and he intends biopsy research. Suspect cases occur, indeed, but because of the mentality of the mothers it is very difficult to get permission to make autopsies of dead children.

8. Intestinal Protozoa

Among all human intestinal protozoa *Lambliia intestinalis* is the most common (but it is found in children only). This species is known to cause dysentery. *Entamoeba histolytica*, too, is a problem for Iraqi medical parasitologists. Its incidence is 25 percent of the persons investigated. Large and small races occur.

9. Schistosomosis

Schistosoma mansoni does not occur in Iraq, but *Schistosoma haematobium* is widespread. The infection with this species was even known to ancient Arabs to occur here. Despite the bulk of studies on Schistosomosis undertaken in Iraq, this disease still remains one of the major health problems in the country, and "Iraq contains one of the world's two major foci of *Schistosoma haematobium*" (*Babero & c.* [7]). *Bulinus truncatus* is recorded to be the only vector of *Schistosoma haematobium* in Iraq. *Najim* [20] records this snail as being "common in the middle and southern parts of the country". Some of these snails he found infested with the cercariae of *Schistosoma haematobium*. It should not be confounded with *Physa (fontinalis)*, which also occurs in Iraq. *Najim* [21] mentions some criteria for the differentiation of the species.

El-Gindy [11] found temperature to be decisive in the percentage variation of infection of *Bulinus truncatus* with *Schistosoma haematobium*. The snails were found free from infection from January to the end of May and reached a peak in July at 62 percent, which corresponded to high air and water temperatures. The smallest snail found infected was 4 mm high and had an immature schistosome infection, and the peak was reached in 14 mm high snails. A paramphistome cercariae infection seemed to interrupt the schistosome infection in snails. The percentage of snail infection at different locations at a river depended on the amount of pollution of the water with human infected excreta.

Up to now control measures have been concentrated on molluscicide application, and in this field Iraqi scientists did intensive investigation work. *El-Gindy* and *El-Gindy* [12], for instance, compared the effects of CuSO_4 , NaPCP and Bayluscide, but their results were not convincing in any direction. In practice, Santobrite is a commercial NaPCP [= sodium pentachlorophenolate] formulation used for snail control.

After the findings of *El-Gindy* [11], control measures by molluscicides should best be applied in May and early June to free the rivers from snails in that decisive period for danger of infection.

Besides it is worth mentioning that "swimmer's itch" is not always produced by *Schistosoma haematobium* but may also depend on cercarial infection of lower animals.

As the knowledge on parasite distribution in Iraq is generally not very well founded it is not easy to get correct information. So doctors may tell you that in rural areas women are not allowed by her husbands or parents to be investigated diagnostically (not even blood smears); or that a farmer sees the doctor and presents his son with the question as to what disease he might have because his urine is not red. But both these instances (which I heard personally) do not hold any longer, at least for the last ten years.

In laboratory studies, *Najim* and *Al-Saad* [22] failed to infect *Gyraulus ehrenbergi*, *Bulinus truncatus* and *Physa* (*~ fontinalis*) with the Egyptian strain of *Schistosoma mansoni*.

10. Liver flukes in man

Fasciola hepatica seems to be present sometimes in man, too. *Fatta & c.* [16] reported a case of the recovery of an immature specimen of *Fasciola gigantica* from a subcutaneous abscess of a 25 year-old Arab housewife from Baghdad.

11. Cestodes

The Iraq, like most countries of the Middle East, is endemic for certain helminths. *Taeniarrhynchus saginatus* is very common. On the other hand *Taenia solium* does not exist.

The most serious of the cestodes and indeed of all human helminths is *Echinococcus granulosus*. This is understandable because Iraq sometimes is called a country of dogs. The high prevalence of *Echinococcus granulosus* as a disease of man is valid even for Baghdad. *Babero & c.* [7] have found adults of this tapeworm commonly in stray dogs of the city and they believe after some preliminary investigations that raw vegetables commonly eaten in Baghdad are a potential source of infection. In the last twenty years about 50 patients were operated every year in the Republican Hospital of Baghdad. It is apparent from the present data that the hydatid disease is endemic in Iraq and constitutes one of the major public health problems in the country. The hydatids of *Echinococcus granulosus* can be seen every day in a high percentage of the livers and lungs at any slaughterhouse in Iraq.

Already *Leiper* [19] proposed extinguishing all stray dogs and jackals. Now this project is being followed, and many dogs have been killed in Baghdad. Comparing the impressions of 1965 and 1966 one can say that the number of stray dogs in Baghdad has diminished considerably.

Alveococcus multilocularis has not been reported.

Rodentolepis nana is a common parasite in tropical and subtropical countries including the Middle East countries, and it also occurs in Iraq. *Rodentolepis diminuta* can also be expected in human infections in Iraq since this parasite has been reported from Egypt, Iran, Lebanon, Syria, Palestine and Turkey.

12. Nematodes

The main helminth diseases of man in Iraq are ancylostomosis and schistosomosis, but less information is at hand regarding the other human helminthoses. The few data available show that almost 100 percent of the population are infested with at least one species of helminths (up to 5 different species). At least in all human autopsies with parasitological examinations from 1 to 3 helminth species are found.

Ancylostoma duodenale infection has long been recognized as an important health problem in Iraq, and several publications were especially devoted to the hookworm disease. Considering the present situation it is surprising to read in the anonymous

report of 1942 [4] that no hookworm disease records at all were available from Iraq at that time.

Trichocephalus trichiura certainly occurs everywhere, but exact information is sparse, probably because of difficulties in diagnosis. Its prevalence may not be as high as that of *Ascaris lumbricoides*, but the geographical distribution will probably be the same. According to another information *Trichocephalus* was said to be the most common species of all human helminths in Iraq.

Ascaris lumbricoides lumbricoides has frequently been reported from all regions of the country. Larval infections with other "Ascarids" (*Toxocara canis*, *Toxascaris leonina*) are not rare either.

There is some difficulty to get exact reference about the *Enterobius* infestation rate. The long-held belief of a low incidence of *Enterobius* infection in man may be due to the fact that its diagnosis is difficult if well-trained personnel is not available. But on the other hand it may well be possible that the general infection rate is much lower than in Egypt, and this fact could be influenced by the dryness of the climate. But it must be noted that *Babero & c.* [7] reported an infection rate of 100 percent. They confirm a relatively low incidence of infection by this parasite which they explain with the practice in Iraq of ablution of the perineum after defaecation. But I think the same practice is realized in Egypt.

Strongyloides stercoralis infections seem to be a very common disease in Iraq. As the life-cycle of *Strongyloides stercoralis* resembles that of *Ancylostoma duodenale* the geographical distribution of this species in Iraq could be expected to resemble that of the hookworm. Dogs and cats may contribute to the dissemination of the species. Iraq is known as a country of dogs but at present in Baghdad wild "domestic" dogs are killed in the hygiene program of *Echinococcus* eradication.

Trichostrongylus colubriformis was found several times as a human infection in Iraq. But further investigation is necessary. *Trichostrongylus orientalis* has not been encountered.

Trichinella spiralis is not recorded from Iraq.

13. Bugs and lice

Cimex lectularius is lacking; probably the climate is too dry. Against any house pest trouble, DDT is used.

Pediculus occurs in the Baghdad region and in the North of the country. Both species are prevalent but *P. humanus* is more common. This led to rickettsial typhus in Iraq [4].

Many years ago *Buxton* published some interesting studies on the degree of lousiness in the Iraqi population. He found much more people with only few lice than people with heavy infestation [7a]. No comparable data are known from Central Europe but I always wondered if these data should be considered as relevant for other situations. Based on my experience with the Iraqi climate I think it to be a special Iraqi situation, because the dryness of the air is less favourable for developing heavy lousiness.

14. Mosquitoes

The prevalent species of *Anopheles* are *A. claviger*, *A. fluviatilis*, *A. hyrcanus*, *A. "maculipennis"* (probably *maculipennis* s. str.), *A. marteri*, *A. sacharovi*, *A. stephensi*

and *A. superpictus* (cf. chapter 4). Other anopheline species are *Anopheles algeriensis*, *A. culicifacies*, *A. dhali*, *A. multicolor*, *A. pulcherrimus* and *A. sergenti*. *Aedes* is represented at least by *A. caspius*.

A surprising phenomenon is connected with the southern main and most dangerous vector, *A. stephensi*: it shows almost absolute dieldrin resistance even in such regions in which no insecticide has been applied before. This is one of the reasons why DDT is applied as control measure.

15. Flies

The dominant Iraqi housefly is *Musca domestica domestica*. It is a great problem in Iraqi towns. *Musca humilis* can often be seen in Iraq covering the eyes of small children.

Other known *Musca* species from Iraq are *M. sorbens* and *M. mesopotamiensis*. *M. nebulo* has not been found in Iraq. Flies, if troublesome, are controlled by fogging etc.

Also myiasis is widespread in the Iraq. Mostly the species is *Wohlfahrtia magnifica*. Other diptera may contribute to myiasis but no accurate study has been made.

16. Fish stings

The silurid fish *Heteropneustis* [syn. *Saccobranchis*] *fossilis* (Fig. 3) was introduced in 1959 by chance (probably by a ship coming from India or so) to Iraq and since then it has reproduced enormously. Now it is not only widespread in the Euphrates

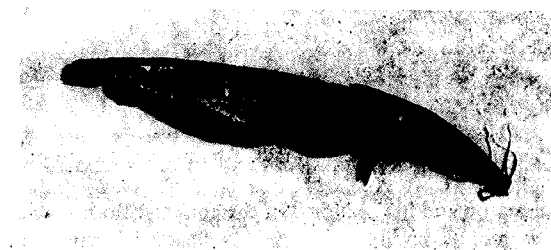


Fig. 3. The poisonous fish *Heteropneustis fossilis*.

(Photo: Krutzsch. In nature 16 cm long.)

and the Tigris but also in irrigation canals. Its breast fins are modified in such a way as to bear a poisonous sting. Following a sting, human beings suffer for 2 to 3 hours from muscle pain. People call this species Colonel-Fish because the late Colonel *Kassem* is said to have introduced it into the rivers to prevent people infecting themselves with *Schistosomosis*. Of course this is not true.

The presence of this fish is said to prevent some people swimming in the Tigris river thus avoiding infection with *Schistosoma*. The Iraqi fishers call the fish, therefore, "Abu Hakim", which means "Doctor's father".

Sometimes the fish is also called as "Republic fish" because it is present since the erection of the Republic.

It is said that the fish eats *Bulinus* snails, the vectors of *Schistosomosis*. But it is not sure if this is true.

In any case, this fish species now presents a very interesting problem of medical zoology. Indeed, when I made my first trip to Baghdad, I did not imagine that I would be confronted in the first days of my sojourn with such an unexpected special problem.

C. VETERINARY PARASITISMS

Due to the agricultural structure of the Republic of Iraq and because of the sparse information on veterinary parasites the survey of veterinary parasitisms has been arranged according to host species. Cases which refer to two or more species are recorded under the host mentioned first.

The chief interest of veterinary parasitology in Iraq is in sheep parasites. The sheep industry is concentrated in Central and Southern Iraq and sheep parasitoses are held to be serious. In contrast, internal parasites do not present any particular problems in cattle.

In spite of this almost no extensive studies on the parasite distribution in livestock have been made. The leading report seems to be that of *Leiper* [19] from which I got a great deal of information to be used for my own paper [10].

With the exception of sheep and fowl, veterinarians observed in Iraq no significant infestation with ectoparasites on animals. Sheep and fowl have enough humidity in their hair or plumage, whereas in other hosts the dry air affects the ectoparasites.

17. Sheep parasites

17a. *Sheep protozoa*. Ovine piroplasmosis is caused by *Theileria hirci*, *Anaplasma ovis* and *Babesia motasi*. The last named species is mainly responsible for the outbreaks in the North. Sometimes it is recorded as *Babesia ovis*.

Outbreaks in flocks generally follow heavy infestations with ticks. They occur – like theileriosis – usually in spring in sheep but throughout the summer in cattle. Treatment is made with Acaprine or Babesan.

Sheep parasitoses of minor significance include coccidiosis.

17b. *Sheep trematodes*. Liver fluke is common in sheep, goats, cattle, and buffalo. The common species of liver fluke in Iraq is *Fasciola gigantica* which occurs in sheep, goats, cattle and buffalo in all areas of Iraq (but especially in the Central and Southern liwas). *Fasciola hepatica* is found in sheep and goats in the North and Northeast in the hilly regions.

Fluke disease usually follows a year of abnormally heavy rainfall. *Fasciola gigantica* was treated in the past by CCl_4 -capsules or CCl_4 -injections in the stomach (or intramuscular).

Lymnaea euphratica is suspected to be the vector of *Fasciola gigantica*. *Galba truncatula* was found by *Najim* [20] "in great number in the stream of Shaklawā".

Rumen flukes (*Paramphistomum microbothrium* and perhaps other species) are present in large numbers in sheep, cattle, and buffalo. The young stages which live in the small intestine cause enteritis and loss of condition. It is not known which species of snails are the vectors in Iraq.

Sheep is infected by two species of Schistosomes, *Schistosoma bovis*, whose vector is *Bulinus truncatus*, and *Ornithobilharzia turkestanica*, which has *Lymnaea euphratica* as its intermediate host.

17c. *Sheep cestodes*. *Coenurus cerebralis*, the larval stage of *Multiceps multiceps*, is common in Iraq.

For *Echinococcus* hydatids see chapter 11.

17d. *Sheep nematodes*. Species confirmed in sheep in Iraq were *Haemonchus contortus*, *Ostertagia circumcincta*, *Ostertagia trifurcata*, *Ostertagia occidentalis*, *Camelostrongylus mentulatus*, *Marshallagia marshalli*, *Trichostrongylus axei*, *Trichostrongylus vitrinus*, *Trichostrongylus colubriformis*, *Trichostrongylus probolurus*, *Bunostomum trigonocephalum*, *Nematodirus filicollis*, *Strongyloides papillosus*, *Chabertia ovina*, *Oesophagostomum venulosum*, *Setaria labiatopapillosa*, and a *Trichocephalus* species.

Gastro-intestinal nematodes are the most important group of worms that cause disease in sheep and goats in Iraq. Those of the genera *Haemonchus*, *Ostertagia*, *Marshallagia* and *Trichostrongylus* were the most pathogenic and were found in the greatest numbers. Particularly the stomachworm, *Haemonchus contortus*, caused heavy losses in flocks of adult sheep all over the country during the lean months of the year. *Haemonchus contortus* is being treated with phenothiazine. Every year one million sheep are treated against stomach worms.

Contrary to the findings in many other countries, in Iraq it is the adult animals that suffer most from infestation with gastro-intestinal nematodes. Lambs were generally found to be in a much better state of health and freer from parasites than the ewes. One of the reasons for this situation is the fact that mostly the flocks migrate into the desert immediately after lambing. So the young stock is taken away from the areas of heavy parasitic infection and kept on the move in clean areas during the first six months of their lives. Therefore the Iraqi practice of sending sheep into the desert as soon as rain falls in autumn is excellent from the point of view of controlling parasitic nematodes.

Dictyocaulus filaria of sheep is believed to be more a starvation problem than a problem of parasitism. These lungworms are sometimes present in large numbers in the bronchi of sheep and goats. Intratracheal injections, used in the past, are now replaced by Certuna and Dictycide.

17e. *Sheep mites and ticks*. Sheep suffer heavy losses all over the country from infestation with ectoparasites: mange mites, lice and ticks (often associated with debility of the animals, particularly in late summer and winter when food is scarce).

The commonest species of ticks throughout the animal population are *Hyalomma excavatum* and *Rhipicephalus sanguineus*. The greatest numbers of them were found in spring and in summer. Other tick species found on sheep were *Hyalomma detritum*, *Rhipicephalus bursa*, *Boophilus annulatus*, *Amblyomma punctata*, *Dermacentor marginatus*, and *Ornithodoros lahorensis*. *Ornithodoros lahorensis* occurs in the north and is common only in winter in animals that are housed at night. This tick also attacks people.

About 5 percent of the sheep were affected with *Psoroptes ovis*. The tail mange of sheep probably was due to a *Sarcoptes* species.

Sheep dips are used against ticks and mange. Formerly arsenic dips were used, nowadays BHC is preferred. Every year four million sheep are dipped. Ticks are very widespread, and psoroptic mange is quite common, too.

Trombiculidae were sometimes observed in sheep, but the species have not been determined.

17f. *Sheep lice*. Sheep are infested with the biting louse *Lepidopteron ovis*. The sucking louse *Linognathus africanus* is common along the backs of sheep, where these lice suck blood and cause a moist, itchy lesion on the skin. It was also reported from goats.

17g. *Sheep diptera*. *Oestrus ovis* is very widespread in sheep in Iraq. In the early months these nasal bot maggots are almost invariably present in sheep. Over forty specimens may be found in one sheep. Sometimes the signs of its presence were mistaken as evidence of lungworm infestation. The economic importance of the nostril fly is difficult to assess, but it must be considerable.

The sheep ked *Melophagus ovinus* occurs only in the North (reported from Mosul). A *Lipoptena* species infests sheep and goat.

18. Cattle parasites

The Iraqi cattle industry includes domestic cattle and water buffaloes. Internal parasitisms seem to be of minor importance in cattle. To some extent cattle may be infested with the liver fluke. Therefore the only major problems which should be mentioned in detail are piroplasmoses and hypodermosis.

The prevalent piroplasmosis is caused by *Babesia bigemina*. *Theileria annulata* follows in the second place. It was observed that the *Theileria* infection may be acquired by prenatal infection. *Anaplasma marginale* has not been found in Iraq.

Iraqi cattle are resistant to *Theileria*, though the indigenous stock is, generally, of poor quality and is not well looked after by their owners. Imported western breeds receive more food and, as a result, are better nourished and well looked after. However these cattle – as well as their crosses – are very susceptible to theileriosis and piroplasmosis. They may even die suddenly as a result of a *Theileria* infection.

The dominant tick species are *Hyalomma*, *Rhipicephalus*, and *Boophilus*. I myself collected *Hyalomma anatolicum* from a cattle specimen in the Baghdad slaughterhouse (Fig. 4).

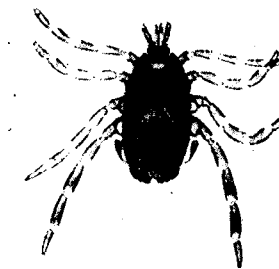


Fig. 4. Cattle tick, *Hyalomma anatolicum*.

Warble flies of the genus *Hypoderma* damage cattle and goats. Both cattle species, *Hypoderma bovis* and *Hypoderma lineatum*, have been found in Iraq. But the dryness of the climate and the strong sunshine seem to limit the degree of infection.

An interesting phenomenon not yet analyzed in detail is the fact that *Hypoderma bovis* is restricted to the north of the country and *H. lineatum* occurs in the central part. Biting and sucking lice are present as cattle parasites, too, but the only cattle sucking louse species reported from Iraq is *Linognathus vituli*. *Trichomonas* seems to be absent from Iraqi cattle.

19. Buffalo parasites

Rumen fluke and liver fluke were commonly seen in slaughterhouses in buffaloes, but the infested animals did not appear to be suffering much damage from these parasites. In general the buffaloes were in a good condition, except for some cases of mange.

Gigantocotyle explanatum was found in buffaloes in the South.

Haematopinus tuberculatus is known to be distributed on buffaloes, and I could confirm this on several buffaloes in the Baghdad slaughter-house. Almost each host individual was parasitized by this louse. Immediately after killing the buffaloes their lice promenaded – showing excited behaviour – on the venter skin. Thus it is very easy to collect them (Fig. 5).

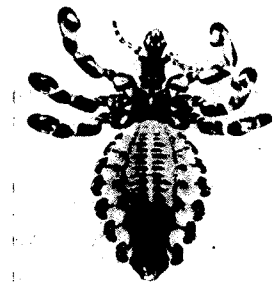


Fig. 5. The sucking louse of the buffalo, *Haematopinus tuberculatus*.

20. Camel parasites

In camels a great problem is *Surra*, caused by *Trypanosoma evansi* and said to be transmitted by *Stomoxys* and *Tabanids*. Sometimes this disease is very severe in Central Iraq and in some years 30,000 camels had to be treated against this infection. The best drug is Naganol. Antrycide (ICI product) gives good results, too, especially in water-soluble preparation.

Faecal examination of camels seldom revealed the presence of nematode eggs, and this was certainly due to the fact they only grazed the arid regions.

The camel has *Hyalomma dromedarii* as a tick species confined to this host.

21. Horse parasites

Horses are affected by "strongylids", and during the summer some cases of *Habronema* infections occur. Quite a problem is caused by *Nuttallia equi*. But in Iraq horses have been replaced by supermodern cars to a large extent.

The only horse bot fly species recorded from Iraq is *Gasterophilus intestinalis*.

22. Donkey parasites

Contrary to what has been said about the horse, the donkey is still important as an Iraqi house animal. It is affected (like horses) by *Dourine* (caused by *Trypanosoma equiperdum*).

Lice have not been recorded before from horses or donkeys from Iraq. When I inspected about twenty living asses from different localities for ectoparasites, I found at least two of them more or less heavily parasitized by *Haematopinus asini asini*, the donkey louse (Fig. 6). This parasite seems to be relatively common on asses,



Fig. 6. The sucking louse of the donkey, *Haematopinus asini asini*.

and it has often been reported. Most of the authors did not realize that the donkey louse is quite different from the horse louse and represents at least a separate subspecies. Following the statements of *Fahrenheit* I have shown this several times (cf. *Eichler* [8]).

The biting louse of the ass is known as *Werneckiella equi asini*. I found only two specimens of this species on the back of one ass (Fig. 7), when inspecting living asses from different localities for lice. Even though it is not easy to draw conclusions from



Fig. 7. The biting louse of the donkey, *Werneckiella equi asini*.

the difficult inspection of living animals for their ectoparasites, it can be said that the biting louse seems to be much rarer in donkeys than the sucking louse. It should be mentioned that *Vrdzic* and *Rtjavec* [27] seem to have found the above mentioned two louse species in Yugoslavia, too. They call their lice from donkeys "*Bovicola equi*" and "*Haematopinus asini*", but this – undoubtedly – is not correct¹⁾.

23. Goat parasites

The goat *Hypoderma* is a problem as in other oriental countries. The warble fly species on goats are reported by *Leiper* [19] as being *Hypoderma aegypti* and *Hypoderma aeratum*. – It may be noted in passing that Cyprus has been successful in eradicating its goat *Hypoderma*.

Coccidiosis occurs occasionally in goats.

Bovicola caprae causes losses of hair and of general bodily condition in goats. Other biting lice species found on Iraqi goats are *Bovicola limbatum* and *Holakartikos crassipes*.

24. Poultry parasites

The domestic fowl is affected by *Argas persicus* and the domestic pigeon by *Argas reflexus*. *Argas persicus* may cause heavy infections in poultry farms.

Leiper [19] did not record any biting lice from domestic birds. *Bahjat Al-Janabi* collected in 1965 some domestic fowl lice in Baghdad, which I determined all as being *Cuclotogaster heterographa* (Fig. 8, 9).

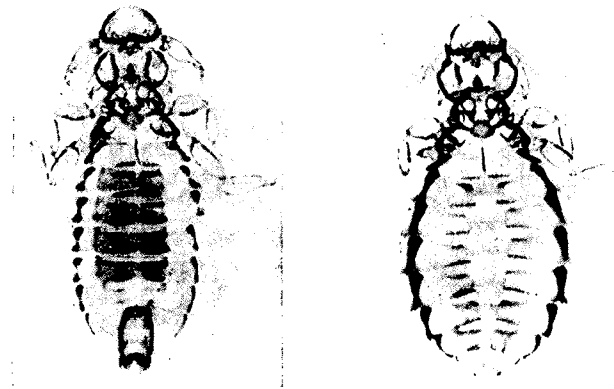


Fig. 8/9. *Cuclotogaster heterographa*, a chicken biting louse. 8 male, 9 female. Slides WEC 100031 and 10003 f.

All microphotos have been made by Hochschul-Film- und Bildstelle der Humboldt-Universität (Berlin) after specimens collected in the Baghdad region by the author (Fig. 4, 5, 6, 7) or by *Mr. Bahjat Al-Janabi* (Fig. 8, 9).

¹⁾ Besides from their text can be concluded that these lice should have been reported from Yugoslavia even at a former date, because they write about *Trichonema aegyptiacum*, *Cylioecylus auriculatum* and *Poteriostomum skrjabini* that these worms "were found for the first time in our country". But in their bibliography I did not find any reference on the lice question and a personal letter to the authors remained without an answer.

Coccidia were found in the faeces of sheep, cattle and goats, but there was no evidence that these parasites were causing any trouble in Iraq. It seems, however, quite possible that coccidia do cause disease in young fowl.

25. Dog parasites

All the stray dogs of Baghdad are infested with *Echinococcus granulosus* (see chapter 11).

Otherwise, as far as is known from Iraq, dogs are often infected with (and show cutaneous lesions caused by) *Dirofilaria repens*. *Babero* & c. [6] have examined 25 adult dogs for helminths and found *Spirocerca lupi* in 13 of them.

26. Not-specific livestock insects

Tabanids occur in marsh areas. *Simuliids* may also been found there. *Stomoxys calcitrans* may occur in large numbers. *Myiasis* is rare and in no case a real problem. *Khalaf* has described some new species of *Ceratopogonidae*.

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Summary

Wd. Eichler: Outline of Iraqi parasitology

The paper gives an assessment of studies on parasitisms arranged according to their medical and veterinary importance. The investigations were carried out by the author during his stays in Iraq, where he was able to supplement personal information and references by a few findings of his own.

Wd. Eichler: Abriß der irakischen Parasitologie

Es wird eine nach medizinischen und veterinärmedizinischen Parasitismen gegliederte Auswertung von Erhebungen mitgeteilt, die der Verfasser bei persönlichen Aufenthalten im Irak zusammenstellen konnte, wobei er persönliche Informationen und Literaturbelege auch durch einige wenige eigene Funde ergänzen konnte.

Wd. Eichler: Abrégé de la parasitologie irakienne

L'auteur communique une évaluation d'enquêtes classifiées selon des parasitismes médicaux et vétérinaires et qu'il put faire à l'occasion de plusieurs séjours en Irak. Les informations personnelles et les références bibliographiques purent être complétées par un petit nombre de propres trouvailles.

Wd. Eichler: Esquema de la parasitología iraquesa

El autor comunica una evaluación de encuestas clasificadas según parasitismos médicos y veterinarios, la cual fue compuesta con motivo de permanencias personales en el Irak. Las informaciones personales y las referencias bibliográficas pudieron ser completadas por propios hallazgos.