die Lehre, daß der Sitz der Erblichkeitsvorgänge allein der Kern sei, war verfrüht, und wir wissen vorläufig nichts darüber. Wollen wir aber Vermuthungen äußern, so ist es viel wahrscheinlicher, daß die Erblichkeitsvorgänge sowie die meisten anderen Lebensvorgänge in der Zelle auf intimen Beziehungen zwischen Kern und Plasma (oder präcis: dem dirigierenden Theil des Plasma, dem Centrosoma) beruhen, und daß wir keinen Grund haben in genannter Beziehung den einen oder den anderen dieser Theile zu bevorzugen.

Kopenhagen, Anfang November 1891.

3. Notes on Parasites, III. On the American Intermediate Host of Echinorhynchus Gigas.

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eingeg. 13. November 1891.

In 1868 Schneider stated that *Melolontha vulgaris* acted as secondary host for this parasite. Later, 1887, Kaiser demonstrated that *Cetonia aurata* was also able to act as secondary host, and he believes further that *C. aurata* forms the regular source of infection of this curious and dangerous parasite.

As neither of these insects are found in the United States, the work of Schneider and Kaiser, both of Germany, fails, of course to explain how the American swine become infected with the parasite in question, which occurs in nearly all sections of the country.

Noticing that the hogs around Washington, D. C., very commonly contain this helminth, I determined to find the American insect in which the larval form of the parasite develops. As experiment animals I selected »white grubs« of the genus *Lachnosterna*, and, placing a number of them in a flower pot, I gave them tender roots, etc., to eat, upon which I had sprinkled hundreds of eggs which I took from several female specimens of *Echinorhynchus gigas*. The infection was made Sept. 5th. On dissecting the insect larvae Oct. 20th, I found them enormously infested with larvae of *Echinorhynchus* in various stages of development. From one »grub« I took at least 300 parasitic Echinorhynchi. As I examined some of the grubs before the experiment, and found them free from the parasite, and, as all the grubs examined later contained the characteristic larvae, there seems to be no doubt that the experiment is positive.

Since making this infection I have learned from my friend, Mr. L. O. Howard, Assistant Entomologist of the Department, to whom I am indebted for the insects upon which I experimented, as well as for

the entomological information in this paper, that it is the custom among many of our farmers to make use of their hogs in ridding their grounds of these grubs. If a portion of ground is found to be particularly infested with white grubs, the hogs are turned loose and destroy the grubs. This custom undoubtedly adds, to some extent at least, to the frequency of this parasite among American hogs; for, when a farmer feeds grubs to his hogs, he must necessarily feed them Echinorhynchi at the same time, provided the grubs are infected.

The white grub with which I have chiefly experimented, is the larva of *Lachnosterna arcuata*. According to Mr. Howard, this species has been reported from New York, New Jersey, District of Columbia, Georgia, Iowa and Missouri. The geographical distribution of the parasite in the United States is, however, very much greater than the distribution of this insect. It follows that *Lachnosterna arcuata* is not the only insect in America which can serve as the secondary host to our parasite. *L. dubia* has a much wider range than the former species, and, Mr. Howard tells me that although it is practically impossible to distinguish the larval forms of the three species of *Lachnosterna*, I mention in this paper, he strongly mistrusts that I have both this and the following species among my experiment animals. Specimens of *L. dubia* are found in the National Museum from Maine, Massachusetts, New York, New Jersey, District of Columbia, North Carolina, Ohio, Illinois, Wisconsin, Tennessee, Montana, Nevada, California and Texas. Another closely allied species, *L. hirticula* has been found in Massachusetts, New York, New Jersey, Pennsylvania Maryland, District of Columbia, North Carolina, Illinois, Missouri, Nebraska and Minnesota.

These three species of insect are included in the old species *Lachnosterna fusca,* Froehlich, and since they all have the same habits, feeding upon tender roots, etc., and differ from each other only in the male genitalia, I assume provisionally that all three — in other words, Froehlich's *L. fusca* — can serve as secondary host for *E. gigas*, although I have given an absolutely positive demonstration only in the case of the first species, *L. arcuata.*

In all, 91 species of *Lachnosterna* are recognized in this country, and it seems to me highly probable that some of these other species may serve as secondary host for this parasite, although I have not as yet had an opportunity to experiment with them.

The typical group of the *Cetoniae* is represented in this country by the genus *Euphoria*, of which we have 16 species represented in all parts of this country, except in California. Of the closely allied genera *Allorhina* and *Gymnetis*, we have two species each found mainly

in the southern States. I hope later, through the kindness of Dr. D. E. Salmon, Chief of this Bureau, to be able to extend my experiments to some of these other forms in order to determine whether only the *fusca*-series of *Lachnosterna* can serve as sources of infection to our herds, or whether *E. gigas* can develop in other species of American insects as well.

Schneider's theory that *Melolontha vulgaris* is the secondary host of *E. gigas* in Europe, has met with some objection on the ground that this insect is essentially a phytophag, and not found in the dung heaps. *Lachnosterna* is also open to the same objection, but this objection, it seems to me, is only an apparent one, for the faeces of hogs are by no means confined to the dung heaps, but are found scattered over fields as well. Mr. Ashmead informs me that *Lachnosterna* grubs are found particularly frequent under the manure droppings in the fields, an occurence which is very satisfactorily explained by the fact that the roots of plants under the manure patches are very tender. Now it is perfectly evident that if the eggs of *E. gigas* are contained in the manure dropped upon the fields, they will, in course of time, be washed into the ground directly under the patch, and get upon the young roots of the plants. Upon eating these roots the insect larvae can very easily become infected with the eggs of the parasite. Thus I see no objection to considering a phytophagous insect as a normal intermediate host for our parasite. While I thus support Schneider's *Melolontha* theory, I do not, of course, intend to detract any from the work of my friend Dr. Kaiser, to whom we are indebted for the finest monograph as yet published on the subject of *Echinorhynchus*.

Division of Pathology, Oct. 25, 1891.

II. Mittheilungen aus Museen, Instituten etc.

1. Zoological Society of London.

5th January, 1892. — The Secretary read a report on the additions that had been made to the Society's Menagerie during the months of November and December 1891. Amongst these attention was called to four Spotted-billed Pelicans (*Pelecanus manillensis*), received from Calcutta, and to a second specimen of the Formosan Fruit-Bat— a species originally described from an example received alive by the Society in 1873. — Dr. E. C. Stirling, C.M.Z.S., exhibited some specimens of the new Australian Marsupial (*Notoryctes typhlops*), and gave a short account of the habits of this remarkable animal, as observed in a specimen recently kept in captivity by one of his correspondents. — An extract was read from a letter received from Dr. F. A. Jentink, F.M.Z.S., calling attention to the recent acquisition by one of his correspondents in Java of additional specimens of the rare Bush-Rat (*Pithechir melanurus*). — Mr. Ernst Hartert exhibited a series of eggs of