

MICHAŁ SIEDLECKI (1873–1940)

A FOUNDER OF MODERN KNOWLEDGE OF THE SPOROZOA

BY CLIFFORD DOBELL, F.R.S.

National Institute for Medical Research, London, N.W. 3

(With Plate I)

ON 6 November 1939, shortly after the invasion of Poland, the professors at the Jagellonian University of Cracow were summoned to attend a lecture on "Nazi Science", to be delivered by a high German official. Those who obeyed the order were arrested. The charge brought against them was, in brief, that they had been attempting to fulfil their duties at the University, and were thereby guilty of striving to keep alight the flame of Polish national culture. For these offences the unfortunate professors—some of them old and feeble—were imprisoned and robbed of their property. After being jailed in Cracow they were taken to a convict prison at Breslau and thence to a concentration camp at Sachsenhausen-Oranienburg (near Berlin)—where, of course, many of them died.

Among the unfortunates who perished at Sachsenhausen was Prof. M. Siedlecki, the distinguished zoologist. The circumstances and even the date of his death are not at present known with certainty outside Germany—indeed, they may never be known; but it is believed that he died of heart-failure—due to exposure during the past bitter winter—in January 1940.¹ As Siedlecki was one of the founders of modern knowledge of the Sporozoa, I think readers of *Parasitology*—in all civilized countries—will welcome the accompanying reproduction of his portrait² (Pl. I) and the following notes on his career and his contributions to Protozoology. I publish them as a tribute to the memory of a great original investigator, whose early writings have been an inspiration throughout my own working life.

Michał Siedlecki³ was born, of good Polish ancestry, at Cracow [Kraków, then in Austria] in 1873, and passed most of his life in that famous city. He was a student at its ancient University, and there took his doctor's degree in 1895. In the following year (1896) he studied at the Zoological Institute in

¹ The first intimation I had of his death was from the *Daily Telegraph* (31. i. 40), whose Copenhagen correspondent briefly reported that "Prof. Michael Siedlecki... has, I learn, died of ill-treatment in the Nazi concentration camp at Sachsenhausen".

² The original may be seen in the Molteno Institute at Cambridge. I also possess a copy which Siedlecki gave me in 1926. Another portrait, of much later date, has recently appeared in the *Journal of the Society for the Preservation of the Fauna of the Empire*, Part xxxix (N.S.), April 1940 (opp. p. 16).

³ His real forename was that given above; but he was accustomed to translate it (Michel in French, Michael in English, etc.) when writing in foreign languages.

Berlin (where F. E. Schulze was Professor), and then spent the remaining years of the century working under Metchnikoff at the Pasteur Institute in Paris and at the Zoological Station in Naples (then run by Anton Dohrn, of blessed memory). It was during this brief period (1896–9) that Siedlecki carried out the researches on the Sporozoa which have made his name famous to all protozoologists. After these fruitful excursions abroad he returned to Cracow and remained there, with few interruptions, for the rest of his life. In 1900 he was appointed lecturer at the University, and in 1912 he duly succeeded A. Wierzejski as Professor of Zoology and Director of the Zoological Laboratory and Museum. This position he held to the end of his days—with an interval (1919–21) as Rector of the University of Vilna [Wilno] during its reconstruction after the last war.

Siedlecki's zoological interests were not confined to the Protozoa. His first published paper (1895) dealt with the leucocytes of Urodela, and he afterwards studied the phagocytes of Annelids (1903) and Echinoderms (with Caullery, 1903). With Kostanecki he early published an important work on the cytology of *Ascaris* (1896), while later he devoted much attention to the biology and reproduction of the tropical flying-frog (*Rhacophorus*), which he studied during an expedition to Java (1908–9). Two once well-known papers with Krzyształowicz (1905, 1908) on the spirochaete of syphilis [*Treponema pallidum*] may also be noted here—the parasite being then wrongly regarded as a flagellate. During the latter half of his life he became interested in marine biology (especially fishes) and ornithology, and for many years was Polish representative on the *Conseil Permanent International pour l'Exploration de la Mer* and the International Committee for Bird Preservation. He played an important part in the development of Polish fisheries in the Baltic and the North Sea, and was instrumental in establishing marine biological stations at Hel and Gdynia (now destroyed). The conservation of wild life in his own country, and the scientific exploitation of its natural resources, were matters dear to his heart.

Siedlecki's pioneer work on the Sporozoa (Coccidia and Gregarines) was all done when he was a young man, and his fundamental discoveries were partly made in collaboration with another and more famous protozoologist. To appreciate his own share it is thus necessary to know the details, which I may now briefly recall.

When Siedlecki went to Berlin in 1896 he intended to study the Foraminifera under Fritz Schaudinn (Assistant to Prof. Schulze), who had then just announced some remarkable discoveries relating to these organisms. But at Schaudinn's suggestion, and in order to learn his methods, he embarked instead upon a joint inquiry into a very different subject—the life-histories of the coccidia living in centipedes (*Lithobius forficatus*). At this date Siedlecki was only 23, and his mentor but 2 years older:¹ yet within a few months these

¹ Schaudinn was born 19 September 1871 and died 22 June 1906. He published his first paper in 1893, and took his doctor's degree in 1894—one year before Siedlecki.

two young men succeeded in solving the riddles of the coccidian life-cycle so effectively that everything which has since been found out is merely an elaboration of detail. Before 1896 all the main facts were, indeed, known; but they could not be pieced together properly. Schaudinn and Siedlecki, for the first time, identified or discovered each isolated bit of the jig-saw puzzle, and combined them all into a complete and convincing picture. They thus produced order out of chaos, and laid a solid foundation for all future work. Their joint preliminary paper was read at a meeting of the German Zoological Society in June 1897, and is now one of the classics of Protozoology.

But Schaudinn and Siedlecki never published a full account of their work together. At the beginning of 1897 Siedlecki left Berlin and went to Naples, while soon afterwards Schaudinn—who was also busy with other important investigations—had to do his military service; so the two friends decided to publish their final results separately. As they had found coccidia of two different genera (*Adelea* and *Coccidium* [= *Eimeria*]) in their centipedes, each worker undertook to describe one—Schaudinn taking *Coccidium* and Siedlecki *Adelea*. At Naples, however, Siedlecki was able to confirm their findings, in part, by a study of another form living in cuttle-fish—*Aggregata* [then known as *Klossia* or *Benedenia*]. His accounts of this parasite were published in 1898, and that of *Adelea* was delayed until the following year. The material for all these papers (Siedlecki, 1898, 1898*b*, 1899) was worked up at the Pasteur Institute in Paris, with the assistance of Félix Mesnil. Schaudinn's celebrated description of the life-history of *Coccidium* did not appear until 1900.

All the papers just referred to are now protozoological classics. It is often stated that Schaudinn's final monograph (1900) contains the first complete account of the life-history of any coccidian, but—as will be evident—this is incorrect. It is correct to say that the life-cycle of the Coccidia, in general, was finally elucidated by Schaudinn and Siedlecki jointly (1897), while the latter actually published the first complete account of any species (*Adelea ovata*, 1899). Siedlecki's description of "*Klossia*" [= *Aggregata*]*—*the first complete account of the sexual cycle—even preceded this by several months. And moreover this was all his own work—a beautiful piece of research which has since been amply confirmed in every essential.

The Coccidia living in *Lithobius forficatus* were not completely described by Schaudinn and Siedlecki, and later work has shown that the problem is even more complex than they imagined. In their preliminary paper (1897) they described only 2 species—identified by them as *Coccidium* (or *Eimeria*) *schneideri* and *Adelea ovata*. Before he published his final paper on *Coccidium*, however, Schaudinn discovered that there were really 2 species of this genus in their centipedes—"*C. schneideri*", which he reidentified as *C. lacazei* [now known as *Eimeria lacazei*], and a new species which he named *C. schubergi* [later generally known as *Eimeria schubergi*, and now renamed *E. schaudinniana* (Pinto, 1928)]. It is with this species—not studied by Siedlecki—that Schaudinn's masterpiece (1900) chiefly deals. Moreover, it has since been shown by Schellack & Reichenow (1913, 1915) that in *Lithobius* there is even a fourth species belonging to yet another genus (*Barrouxia*), which Schaudinn and Siedlecki unaccountably overlooked, though some stages of its schizogony were wrongly incorporated in their accounts of *Adelea*.

As regards the coccidian of the cuttle-fish (*Aggregata eberthi*), it is now known that Siedlecki's account covered only half its life-history. He gave a complete description of the sexual cycle in *Sepia*—which he believed to be the whole life-history—but it has since been shown by Léger & Duboscq (1908) that the parasite undergoes also an asexual development in crabs (*Portunus*). This work has been fully confirmed (cf. Dobell, 1925).

The chief addition to knowledge of coccidian life-history, since Siedlecki's day, has been the demonstration that the Coccidia are haploid organisms, with constant chromosome numbers and zygotic reduction¹—a fact unsuspected when Schaudinn and Siedlecki wrote.

In addition to his works on the coccidia of centipedes and cuttle-fish, Siedlecki wrote valuable papers on other species.² In 1898 he described (see Siedlecki, 1898*a*), for the first time, the fertilization of *Coccidium proprium* [now called *Eimeria propria*] from newts [*Triton* = *Molge*]; while later (1902, 1907) he gave a complete account of the life-cycle of *Caryotropha mesnili*—a remarkable form which he discovered in the male germ-cells of a marine polychaete (*Polymnia*). The material for this research was collected—in the post-Schaudinnian period—at Naples, Wimereux, and Trieste. It may be added, in passing, that in 1902 Siedlecki also described a curious astomatous ciliate (*Herpetophrya*) which he found in the same host.

During his stay at Naples from November 1898 till July 1899, Siedlecki obtained the material for his only publication on the Gregarines—his paper on *Monocystis ascidiae* [now known as *Lankesteria ascidiae*], a common parasite of *Ciona*. He completed this work in Prof. Hoyer's laboratory at Cracow, and published it at the end of 1899. The paper (Siedlecki, 1899*a*) deals with the sexual cycle of *Lankesteria*, and Siedlecki believed that he had studied only a part of its life-history; but in fact he described the whole, and described it exactly. Jameson (1920), writing 20 years later, said truly of this “most excellent account” that it “outlined the course of gregarine development in a masterly fashion and left only the details to be filled in”. The most important detail was filled in by Jameson himself,³ who showed that the Gregarines—or many of them, at least—are, like the Coccidia, haploid organisms with post-meiotic reduction.

Just as Schaudinn and Siedlecki together produced order out of chaos in our knowledge of the Coccidia, so Siedlecki alone clarified, at a stroke, the muddled conceptions then prevailing about the development of the Gregarines. When two people publish a piece of work together, there must always be some doubt regarding the share of credit due to either; and consequently we cannot now say whether Schaudinn or Siedlecki first elucidated the life-history of the Coccidia. Apparently they did it jointly, so our gratitude should be expressed to both equally. Unfortunately this is seldom done, and Siedlecki's solid achievements have thus been overshadowed by the fame of his East-Prussian collaborator. But as regards the Gregarines there is and can be no un-

¹ See Dobell & Jameson (1915), Dobell (1925).

² A genus *Siedleckia* was introduced for a very remarkable sporozoon by Caullery & Mesnil in 1898: but this was not a form which he himself studied.

³ See Dobell & Jameson (1915), Jameson (1920).

certainty. Schaudinn never wrote anything original about these organisms:¹ Siedlecki—alone and unaided—laid the foundations of modern knowledge in 1899.

For two generations elementary students of Zoology have been taught the life-histories of “Coccidium” and “Gregarina” as outlined originally by Schaudinn and Siedlecki, but they seldom realize—any more than their teachers—how tremendous a transformation these two young men wrought in our knowledge of the Sporozoa. Yet one has only to compare Wasielewski’s *Sporozoenkunde* (1896) with Minchin’s “Sporozoa” in Lankester’s *Treatise on Zoology* (1903) to see the results of the revolution. The first work, though good for its period, is inchoate, disjointed, and hard to comprehend: the second presents the subject in beautiful order—with everything definite and in its proper place, so that everyone who reads may understand. The difference is not due solely to Minchin’s greater powers of exposition: it is also due largely to Schaudinn’s and Siedlecki’s intervening discoveries, and Schaudinn’s exceptional ability to exploit them. Of Siedlecki’s contribution it may be justly said that his work has now so completely permeated the *corpus* of modern protozoological knowledge that its origin is almost forgotten and its correctness is no longer questioned. This is surely the hall-mark of fundamental scientific research.

The observations of Schaudinn and Siedlecki on coccidia and gregarines have an interest which is not merely academic; for they illuminated and explained the simultaneous discoveries of Ross and Grassi regarding the parasites of malaria, and thus played an all-important part in establishing our present knowledge of these organisms. Without the fundamental researches of Siedlecki it would have been impossible, forty years ago, to understand the complicated life-cycle of *Plasmodium*. For this application of his work alone, therefore, Siedlecki has earned the gratitude of mankind. Yet it is possible that he hardly realized the full significance of his own discoveries, and the magnitude of their implications; for he was a simple and modest man, who—unlike some of his contemporaries—never boasted of his prowess or advertised his achievements.

I never had the luck to meet Siedlecki in the flesh; consequently, all I know about him personally is derived from the study of his publications and desultory correspondence during the last 30 years—supplemented by the reports of mutual friends. Everybody who knew him remarked his scientific and administrative ability, his good breeding, his fervid patriotism. In an anonymous obituary (*Nature*, 145, 963: 22 June 1940) it is recorded that “he was deeply respected by everyone with whom he came in contact, of whatever nationality,² and those who had the privilege of working with him

¹ It may be of interest to add that Schaudinn began to study the gregarines of *Lithobius*, but never finished these researches. It was in the course of this study that he encountered the coccidia which inspired his work with Siedlecki.

² Except one? Perhaps the exception proves the rule.

will always remember him with a lasting affection." Miss Phyllis Barclay-Smith adds (*in litt.*): "His modesty, his great width of vision and understanding, and his gaiety were exceptional. He was interested in everything, and I think everyone...at once felt his charm." D'Arcy Thompson—who saw much of him on the *Conseil International*—writes to me: "He was a little, quiet, intensely cheerful and happy man...without an enemy¹ or a hard thought of anyone. He was a sort of polymath, knowing all sorts of unexpected things. He spoke English admirably, German (of course) perfectly: and he could make shift to speak I don't know how many tongues besides." From my own experience I can attest that he was scientifically modest about his accomplishments—always ready to accept competent criticism and correction, never claiming priority or prestige, and benevolent to younger and less gifted workers. A few lines from a letter which he wrote to me on 7 January 1926—*à propos* of my confirmations and criticisms of his work on *Aggregata*—will serve in illustration of this aspect of his personality. He wrote (in English): "I am aware that every scientific work, and especially the biological ones, can be repeated after some years and always new facts can be discovered and new ideas introduced. Science is in continuous progress, the manner of thinking changes, the methods are developed; and therefore I consider it as quite natural that new works contain critical remarks concerning the older ones. But, really, it is a great satisfaction to see that, after a careful study made by [a]...specialist, the main framework of my study remains nearly untouched...I accept justified criticisms always gratefully, because I am conscious that they indicate a new progress of Science."

The main framework of Siedlecki's study of the Sporozoa still remains, indeed, almost untouched. His poor old Polish body has been wantonly destroyed, but his works and his spirit are inviolable and unconquerable and will march proudly on for ever in the service of science and humanity.

For some of the biographical information in the foregoing article I am indebted to friends and correspondents—especially Prof. Count K. Wodzicki, Sir D'Arcy Thompson, F.R.S., and Miss Phyllis Barclay-Smith (Secretary of the International Committee for Bird Preservation). To these I offer my thanks once more. My estimate of Siedlecki's work is based upon personal study of his publications and the organisms which he investigated, and the literature on the Sporozoa from its beginnings to the present day.

¹ Cf. preceding footnote, and the first paragraph of this article.

REFERENCES

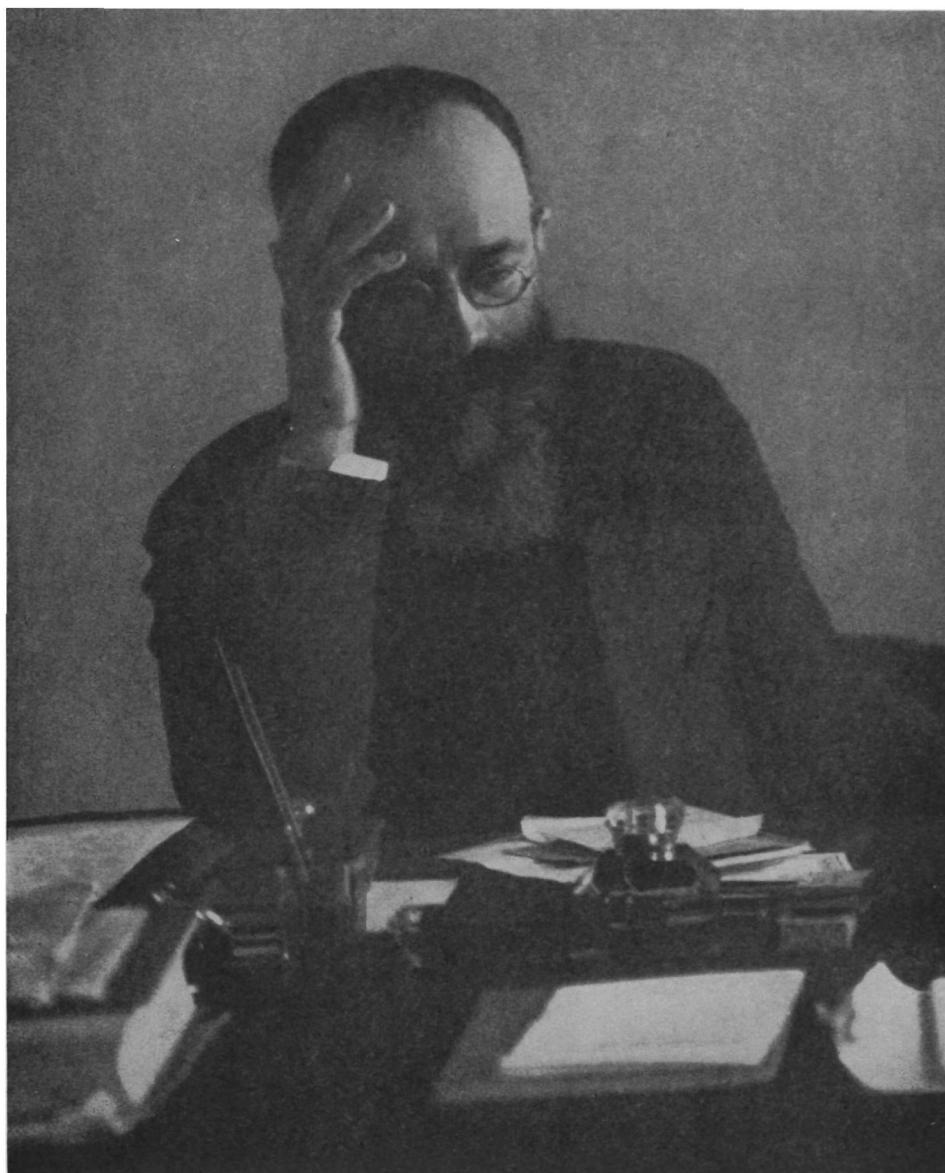
The following is a list of Siedlecki's chief papers on the Sporozoa, with notes on dates of publication:

- SCHAUDINN, F. & SIEDLECKI, M. (1897). Beiträge zur Kenntnis der Coccidien. *Verh. dtsh. zool. Ges.* pp. 192–203. [Paper read 11 June at 7th annual meeting (Kiel, 9–11 June); followed by discussion (p. 203) and demonstration (p. 214). Schaudinn's memory was at fault when he stated later (1900, p. 199) that the paper was read "in May 1897".]
- SIEDLECKI, M. (1898). Reproduction sexuée et cycle évolutif de la coccidie de la seiche (*Klossia octopiana* Schn.). *C.R. Soc. Biol. Paris*, (10 sér.) **5**, 540. [Read 14 May, published 20 May.]
- (1898a). Reproduction sexuée et début de la sporulation chez la coccidie des tritons (*Coccidium proprium* Schn.). *Ibid.* p. 663. [Read 18 June, published 24 June.]
- (1898b). Étude cytologique et cycle évolutif de la coccidie de la seiche. *Ann. Inst. Pasteur*, **12**, 799. [Published December 1898.]
- (1899). Étude cytologique et cycle évolutif de *Adelea ovata* Schneider. *Ibid.* **13**, 169. [Paper dated 1 Dec. 1898; published February 1899.]
- (1899a). Über die geschlechtliche Vermehrung der *Monocystis ascidia* R.Lank. *Bull. int. Acad. Sci. Cracovie*, p. 515. [Published December 1899.]
- (1907). Über die Struktur und die Lebensgeschichte von *Caryotropha mesnili*. *Ibid.* p. 453. [Published May, 1907. Preliminary paper *ibid.* 1902, p. 561.]

Other papers on the Sporozoa specifically mentioned in the text are:

- CAULLERY, M. & MESNIL, F. (1898). Sur un sporozoaire aberrant (*Siedleckia*, n.g.). *C.R. Soc. Biol. Paris*, (10 sér.) **5**, 1093.
- DOBELL, C. (1925). The life-history and chromosome cycle of *Aggregata eberthi* [Protozoa: Sporozoa: Coccidia]. *Parasitology*, **17**, 1.
- DOBELL, C. & JAMESON, A. P. (1915). The chromosome cycle in Coccidia and Gregarines. *Proc. Roy. Soc. (B)*, **89**, 83.
- JAMESON, A. P. (1920). The chromosome cycle of gregarines, with special reference to *Diplocystis schneideri* Kunstler. *Quart. J. micr. Sci.* **64**, 207.
- LÉGER, L. & DUBOSCQ, O. (1908). L'évolution schizogonique de l'*Aggregata (Eucoccidium) eberthi* Labbé. *Arch. Protistenk.* **12**, 44.
- PINTO, C. (1928). Synonymie de quelques espèces du genre *Eimeria* (Eimeridia, Sporozoa). *C.R. Soc. Biol. Paris*, **98**, 1564.
- SCHAUDINN, F. (1900). Untersuchungen über den Generationswechsel bei Coccidien. *Zool. Jahrb. (Anat.)* **13**, 197. [Published 22 January 1900.]
- SHELLACK, C. & REICHENOW, E. (1913). Coccidien-Untersuchungen. I. *Barrouxia schneideri*. *Arb. kais. Gesundh.Amt.* **44**, 30.
- — (1915). *Idem*. III. *Adelea ovata* A. Schn. *Ibid.* **48**, 425.

(MS. received for publication 9. VIII. 1940.—Ed.)



*Prof. Michał Siedlecki
5/V 1920. Cracow - Poland.*