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The Genus *Spirorchis* MacCallum, 1918 (Digenea: Schistosomatoidea) and the Early History of Parasitology in the United States

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ABSTRACT: We know little about the founders of our discipline apart from their scientific contributions and brief biographical sketches, most frequently in published obituaries. A number of years ago, Ralph Lichtenfels, then Director of the National Parasite Collection, sent me photocopies of letters between Henry Baldwin Ward, Horace W. Stunkard, George A. MacCallum, and William G. MacCallum dating from the early years of the 20th century that hinted at a series of conflicts centered on the proposal of *Spirorchis* MacCallum, 1918 (Digenea: Schistosomatoidea). The description of a fluke that matured in the blood of a tetrapod and that was morphologically similar to the schistosomes of humans was in its time a transformative discovery; and the scientist who published it would have garnered some scholarly recognition. Herein, I provide an historical account of the issues and the motives of each individual and the eventual resolution of these matters.

On 5 March 1924, Henry Baldwin Ward, Chair of the Zoology Department at the University of Illinois, founder and editor of the *Journal of Parasitology*, received a letter from J. McKeen Cattell,⁴³ owner and editor of the journal *Science*. (Superscripts refer to letters between the principals and are listed in chronological order following the Literature Cited. All letters [and my transcriptions] are available from the Manter Laboratory. Some, but not all, of the original letters are available in the Archives of the Library of the American Museum of Natural History, New York, New York. Published articles are cited in a traditional manner.) The letter was brief and contained 2 inclusions. The first was a letter from Dr. William G. MacCallum, Professor of Pathology, Johns Hopkins University, requesting the publication of a complaint against Ward charging that he had received a manuscript from MacCallum's father, George A. MacCallum, describing 2 new species of *Spirorchis* (Digenea: Schistosomatoidea) almost 2 yr earlier and had neither published nor, despite repeated requests, returned it to the author. The son asked Cattell to publish a notice of this breach of scientific propriety in *Science* and to appoint a panel of scientists to investigate and adjudicate the matter. The second inclusion was a brief history⁴³ outlining the interactions between Ward, the elder MacCallum, and one of Ward's former students, Horace Wesley Stunkard.

Turtle blood flukes (TBFs) are a small, but important, group of trematodes aligned with the schistosomes of birds and mammals and the aporocotylids of fish that together constitute the superfamily Schistosomatoidea. I first encountered this fascinating group of worms when doing my Master's degree (Platt, 1977). Much of my research since that time has been on the taxonomy and systematics of the TBFs.

The early history of TBFs was dominated by the names Ward, MacCallum, and Stunkard. Approximately 20 yr ago, Ralph Lichtenfels, then curator of the U.S. National Parasite Collection, sent me photocopies of letters between these pioneers of the field hinting at a controversy that suggested, at best, a misunderstanding, or, at worst, a disingenuousness bordering on malfeasance. Herein, I attempt to distill the available information and assess the who, what, when, and why of the events surrounding the discovery of TBFs in North America that involved these pioneers of the discipline.

THE PEOPLE

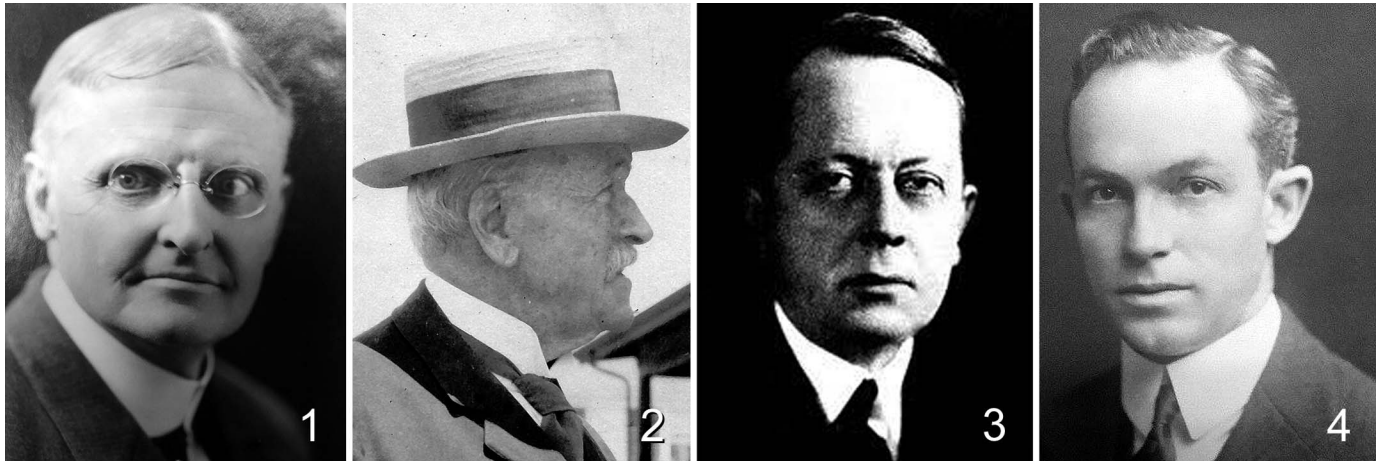
A complete biographical treatment of these individuals is beyond the scope of this paper. There is no professional biographical treatment of any American parasitologist beyond a book on Joseph Leidy, entitled "Joseph Leidy: The Last Man Who Knew Everything" by Leonard Warren (1998, Yale University Press). I will provide enough information to place each individual in the context of the issue. Information on H. B. Ward is primarily from Cort (1945); H. W. Stunkard from Coil (1986); and G. A. MacCallum and W. G. MacCallum from Longcope (1944) and Malloch (1937).

Henry Baldwin Ward (1865–1945)

Ward (Fig. 1) is generally regarded as the "Father of American Parasitology," although some think this distinction belongs to Leidy (Mueller, 1973), as did Ward (1923) himself. Ward established the first and most dominant graduate program in the discipline at the University of Illinois during his tenure as Chair of Zoology from 1909 until his retirement in 1933. Ward graduated from Williams College in 1885 and studied in Germany from 1888 to 1890, including a stint with Rudolph Leuckart at the University of Leipzig. When Ward returned to the United States he enrolled in a Ph.D. program at Harvard and completed his degree in 1892.

Ward taught for a year at the University of Michigan before moving to the University of Nebraska, Lincoln, in 1893. He rose to the rank of professor and dean of the medical college; however, his primary objective was to begin a graduate program based on the German model. Nebraska was unwilling to provide the stipends necessary to support full-time graduate students; therefore, when offered the opportunity to realize his dream at Illinois, he accepted the position. During his years at Illinois, Ward trained students who would determine the direction of parasitology research in the United States for several generations of scholars. Ward established the *Journal of Parasitology* in 1914 and served as its first editor until 1932, when he presented the journal to the American Society of Parasitologists.

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FIGURES 1–4. Portraits of the principals. (1) Henry Baldwin Ward, University of Illinois Archives. (2) George A. MacCallum. History of the Marine Biological Laboratory. <http://hpsrepositary.asu.edu/handle/10776/3363>. Undated. (3) William G. MacCallum, from Longcope (1944). (4) Horace Wesley Stunkard, University of Illinois Archives.

George A. MacCallum (1843–1936) and William G. MacCallum (1874–1944)

There is little publically available information on the life of George A. MacCallum (Fig. 2). He was born in Ontario, Canada, in 1843, earned a medical degree, and had a general practice in Dunnville, Ontario, for many years. MacCallum was an avid naturalist throughout his life. In 1892, MacCallum co-authored the Ontario Game and Fish Commission report with R. Ramsay Wright, Chair of the Department of Biology at the University of Toronto, assessing the status of wildlife in that Canadian province (MacCallum and Wright, 1892). His son, William G. MacCallum (Fig. 3), earned an undergraduate degree at Toronto and studied under Wright. Wright published at least 2 papers on helminthological subjects (Wright, 1879; Wright and MacCallum, 1892). The younger MacCallum, undoubtedly influenced by Wright, published papers on parasitological subjects including malaria and various helminths, several of the latter were co-authored with his father. The MacCallums' parasitological publications are presented in Supplementary Appendices 1 and 2.

When the elder MacCallum retired from medical practice, his son, who was then on the faculty of the Columbia University Medical School, found employment for his father as pathologist for the New York Zoo and New York Aquarium through the New York Zoological Society. George A. MacCallum then began a second career studying the parasites of animals that died at those institutions. The journal *Zoopathologica* (1916–1927) was established to publish the results of his research.⁵¹ Although the elder MacCallum had no formal training in zoology, or parasitology specifically, he embarked on an ambitious program of parasitological study. William MacCallum later accepted a position at the Johns Hopkins Medical School, and the father and son moved to Baltimore.

Horace Wesley Stunkard (1889–1989)

Horace W. Stunkard (Fig. 4) graduated from Coe College (Iowa) in 1909 and began graduate work with H. B. Ward. He earned a Master's degree in 1912, his Ph.D. in 1916, and then accepted a position at New York University. In 1917 Stunkard

volunteered for service in World War I in the American Expeditionary Force and trained as a pilot. Upon his return from Europe sometime in 1919, he returned to NYU and remained there until his retirement in 1954. Stunkard also held a position as research associate at the American Museum of Natural History and conducted research at the Marine Biology Laboratory at Woods Hole during the summer months. He maintained an active research program well into his 90s. During his career, Stunkard served as president of the American Society of Parasitologists, editor of the *Journal of Parasitology*, published over 300 papers, and received numerous national and international honors.

THE BEGINNING

MacCallum (1918a) proposed *Spirorchis*, the first genus of freshwater TBF from the wood turtle, *Chelopus insculptus* (*Glyptemys insculpta*). Unfortunately, he neglected to name the species upon which the genus proposal was based. In March 1921, Ward published a paper in the *Journal of Parasitology* describing a new genus and species of TBF, *Proparorchis artericola*, which had been found in several species of turtles from localities in the Midwest, South, and southeastern United States (Ward, 1921). He also erected the family Proparorchidae and subfamily Proparorchinae to contain the new genus, *Spirorchis* MacCallum, 1918, and *Hapalotrema* Looss, 1899. Ward took the additional step of providing a species name for MacCallum's new genus, which became *Spirorchis innominata* Ward, 1921, or ironically "*Spirorchis* without a name." Ward would not publish a research paper in the journal for another 10 yr.

In July, 1921, Stunkard published "Notes on North American blood flukes" in the *American Museum Novitates* (Stunkard, 1921). Stunkard wrote that he first encountered TBFs as a graduate student at the University of Illinois in 1913. The localities of the turtles noted by Stunkard closely match those described by Ward (1921). Stunkard succeeded in obtaining specimens of *S. innominata* from MacCallum and noted similarities between MacCallum's material and specimens in his possession. Stunkard also noted errors in MacCallum's original description, which resulted in no substantive differences between

MacCallum's *Spirorchis* and Ward's *Proparorchis*. Stunkard synonymized the latter with the former and, following the rules of nomenclature, *Proparorchis* became a junior synonym of *Spirorchis*. In addition, Proparorchidae and Proparorchinae became Spirorchidae Stunkard, 1921, and Spirorchinae Stunkard, 1921 (later emended to Spirorchidae and Spirorchinae, respectively). MacCallum (1921) described a new TBF, *Spirorchis emydis*, from Blanding's turtle, *Emys* [= *Emydoidea*] *blandingii*. The Errata section of MacCallum (1921) referred to the unfortunate omission in MacCallum (1918a) stating, "At pg. 92, Vol. 1. No. 3, *Zoopathologica*: '*Spirorchis* gen. et sp. nov.', should read '*Spirorchis eustreptos* gen. et sp. nov.'"

MacCallum presented a paper at the American Association for the Advancement of Science (AAAS) meeting at the end of 1921 (MacCallum, 1922), wherein he described a new species of TBF, *Spirorchis chelydrae*, from snapping turtles. MacCallum generously loaned these slides to Stunkard for comparison with material in Stunkard's possession. Stunkard (1922) erected 2 new genera, *Hapalorhynchus* and *Henotosoma*, naming 2 new species; *Hapalorhynchus gracilis* and *Henotosoma haematobium*, both from snapping turtles. The new species of *Henotosoma* bore a striking resemblance to MacCallum's *S. chelydrae*. In the spring of 1922, MacCallum submitted a paper for publication in the *Journal of Parasitology* describing 2 new species of *Spirorchis*. Ward neither published, nor returned, the paper for nearly 2 yr despite repeated requests from the author to do one or the other.

Stunkard (1923) published a monograph reviewing all blood fluke genera with particular emphasis on those of North American turtles. He erected a new genus, *Haematotrema*, with the type species *Haematotrema parvum*, as well as 3 new species of *Spirorchis*: *Spirorchis elegans*, *Spirorchis picta*, and *Spirorchis scripta*. This was the most thorough examination of the group providing histological and developmental studies; a work that is still relevant today. MacCallum's final TBF paper (MacCallum, 1926) described 3 new species of *Spirorchis*: *Spirorchis pictae*, *Spirorchis blandingsii*, and *S. chelydrae*, as well as providing redescription of *S. eustreptos* MacCallum 1921, and *S. emydis* MacCallum 1921.

To this point, with the exception of Ward (1921) exercising his role as first reviser and providing the specific epithet "*innominata*" for MacCallum's unnamed species of the newly erected *Spirorchis* and MacCallum's insistence that the name he originally intended ("*eustreptos*") be used instead, the events described appear part of the normal rhythm of taxonomic research and conceal the "sturm und drang" that went on behind the scenes. It is these machinations that I will explore in the remainder of this paper.

RELATIONSHIPS BETWEEN WARD, STUNKARD, AND MACCALLUM

Stunkard was Ward's graduate student, and they should have interacted on a regular basis during Stunkard's studentship. I have no specific information regarding Stunkard's view of Ward as a mentor; however, W.W. Cort, a contemporary of Stunkard's, described Ward as "strict and hard" . . . "but kept close to his students and their work: which insured well-rounded training."⁵² Ward and Stunkard continued to communicate following Stunkard's return from military service. As their correspondence shows,^{2,4,7} they discussed ongoing research, Stunkard's career trajectory, and personal matters.

Ward and G. A. MacCallum apparently had a relationship of some standing, as both men spent time at Woods Hole. It would appear that their relationship was cordial, but it is difficult, based on the material at hand, to determine the depth of their friendship. Stunkard communicated by letter with the elder MacCallum based on Stunkard's interest in obtaining information and specimens MacCallum had collected and described. Ward also encouraged Stunkard to visit and converse with MacCallum to obtain a deeper understanding of his thinking and perhaps encourage MacCallum to conduct more thorough and detailed examinations of the specimens on which he published.²

Did Ward behave ethically when providing a specific name for *Spirorchis*?

Ward (1921) stated that he attempted to contact MacCallum on several occasions without reply before going to print with the name "*innominata*." As "first reviser" Ward was at least nominally obligated to attempt to communicate with MacCallum and give him sufficient time (generally at least a year) to correct the error. Ward claimed to have done both. When MacCallum became aware of Ward's action, he wrote to Ward¹² that Ward did not have the authority to name the species for which the new genus was originally proposed and to correct the name from *S. innominata* to *S. eustreptos* as he had intended (MacCallum, 1921). Ward wrote to Bayard H. Ransom, Bureau of Animal Industry, for advice. Ransom¹⁴ informed Ward that changing the name was not possible based on the rules of nomenclature. MacCallum³¹ wrote to Ward and stated that he was not upset with Ward for naming his species "*innominata*," but with himself for the omission. MacCallum³¹ stated that he did not realize that the name could not be changed and "That is settled and I am satisfied." Ward was justified in taking action in this matter, and when presented with the facts MacCallum agreed and regretted his mistake. It is interesting that Ward wrote to Ransom for advice instead of Dr. Charles W. Stiles, also at the BAI, who was the Secretary of the International Commission on Zoological Nomenclature at the time.

There are 2 nagging questions associated with this episode. First, MacCallum appeared to be a prolific and prompt correspondent. If Ward did, as indicated, write to MacCallum on several occasions, why did MacCallum not respond? Second, if MacCallum were satisfied with the outcome, why did he publish a redescription (MacCallum, 1926) of his first find using his preferred name "*eustreptos*" instead of the correct name "*innominata*"? There are 2 possible explanations to the first question. Ward was being disingenuous and never attempted to contact MacCallum, or Ward did write and MacCallum never received the letters. Without additional information we cannot determine which is true. I will deal with the question of MacCallum's final TBF paper later.

Did Ward behave honorably by publishing on TBFs when his former student was engaged in research on the same topic?

Stunkard (1921) stated "North American blood flukes discovered by the writer were found in 1913, while he was a graduate student at the University of Illinois." He also related the discovery of other TBFs from various species of turtles from the Midwestern and southern United States during his time as a graduate

student at Illinois (Stunkard, 1921) as well as specimens collected from the vicinity of New York City after he had taken a position at New York University following completion of his degree. Ward (1921) stated "For several years an interesting trematode has been under investigation in the laboratory here." He listed many of the same localities for his material as Stunkard (1921, 1922, 1923) presented in his papers. In fact Stunkard (1923: 172) stated that "the distribution and list of hosts given by Ward agree almost exactly with my records of collection while at the University of Illinois. There can be no question that the specimens I had collected are the same as those described by Ward." In a letter to Dr. Frank Etges (Stunkard's last graduate student) in the early 1970s (precise date uncertain) Stunkard wrote,⁵¹

The *Spirorchis* problem was reviewed in my 1923 paper, where I stated that Ward (1921) published my data, much of which was accumulated while a graduate student and the rest communicated to him in 1919 and 1920. Note the letter written to me January 27, 1919 inquiring about my work,⁷ while his paper on *Spirorchis* was already in press. I was pretty much upset when his paper appeared; I was young and struggling for scientific recognition while he was already established.

Ward apparently had a different view of the situation. Ward wrote to J. M. Cattell, editor of *Science*,⁴⁴ that he "learned from some other students that he [Stunkard] was planning to publish on it [TBF] and I had to have a frank talk with him and tell him that he had been assigned to work on another problem and that that subject was under investigation by others and not open to him." Ward reiterated his position in a subsequent letter to W. G. MacCallum a few days later.⁴⁶

Ward was aware of Stunkard's work on *Spirorchis* based on a letter he received from Stunkard dated 2 February 1920.⁴ Stunkard outlined his work on TBFs and asked for advice on publishing in light of the erection of the new genus by MacCallum (1918a). In a subsequent letter,⁷ Ward inquired about the status of his current investigations and asked whether he (Stunkard) had been in contact with MacCallum and whether Stunkard knew about MacCallum's current efforts.

The specimens of *Spirorchis* spp. deposited at the National Museum of Natural History's (NMNH) Invertebrate Collection (Smithsonian, Washington, D.C.; formerly the U.S. National Parasite Collection, Beltsville, Maryland) that formed the basis of Ward's description of *Spirorchis* (= *Proparorchis*) *artericola* were collected by T. B. Magath, a student of Ward's and contemporary of Stunkard's at Illinois, not by Stunkard. Specimens deposited by Stunkard at the American Museum of Natural History, New York (AMNH) from the time Stunkard was a student at Illinois contain contradictory information regarding the identity of the collector.⁵³ For example, the holotype of *S. scripta* Stunkard, 1923 (AMNH 128) was originally identified as having been collected by Stunkard in 1913 from a turtle in Newton, Texas. That information was crossed out and replaced with Raleigh, North Carolina, and no collector identified. The paratype (AMNH 130) has the revised locality data with Stunkard as the collector. Specimens of *H. haematobium* Stunkard, 1922, similarly list Stunkard as the donor but not as the collector. For 3 specimens of *S. elegans* Stunkard, 1923, one identifies Stunkard as the collector, while that field for the other 2 is blank. No collector is identified for any of the specimens of *H. gracilis* Stunkard,

1922, held by the AMNH. There is no question Stunkard donated these specimens to the AMNH; however, who actually collected them is unclear.

It is difficult to believe that Stunkard was not involved in collecting TBFs during his time at Illinois. His Ph.D. thesis involved a taxonomic assessment of trematodes from turtles (Stunkard, 1917), and he published a paper during his studentship on the digenean genus *Telorchis* Lühe, 1899, a common turtle parasite (Stunkard, 1915). Clearly, Ward knew that Stunkard was studying TBFs following his departure from Illinois and made no admonition to leave the subject because they were under investigation by other students at Illinois. Poaching research is not looked upon kindly, and doing so from your former adviser, especially someone as influential as Ward, would have been akin to committing professional suicide. Yet, Stunkard seemed to have no qualms about sharing the nature of his work with his mentor. Was Stunkard justified in his ire at Ward in publishing his 1921 TBF paper?

Ward wrote to MacCallum³⁰ that Stunkard had written to him in late 1916 or early 1917, after moving to NYU but before joining the military, that he had visited MacCallum and indicated that MacCallum had found a trematode that was either identical, or very similar, to the species under study at Illinois and was planning to publish on it. Stunkard felt that the amount of work *they* [my italics] had done justified publishing, but Ward indicated to MacCallum he had told Stunkard³⁰ that they should wait until MacCallum had published. Although the timing of the following is not clear, it appears that Ward submitted the paper to the *Journal of Parasitology* as a single author effort after Stunkard left for military service and then recalled it when he discovered MacCallum was publishing on the same, or a very similar, species. Ward then resubmitted the paper in the mid or late 1920s, after Stunkard's return and MacCallum's paper had appeared in print.

Ward (1921) began his paper "For several years an interesting trematode has been under investigation in the laboratory here." Ward noted the similarity of this new species to "blood-inhabiting flukes of man" and "despite the incompleteness of the observations, publication of this note is justified." And finally, Ward stated

It is further called for by the fact that several others, who had their attention called to this species, plan to give it more detailed study than I can make at the present time, and will be glad to have a record of the facts thus far determined in order to utilize them as the basis for further study (Ward, 1921; p. 114).

The "several others" must have been MacCallum and Stunkard, the only other parasitologists with an interest in the group at the time. It is clear that Stunkard, as indicated in his letter to Frank Etges,⁵¹ was not glad to have been, in his mind, scooped by his mentor. This would be particularly true if the professor and student had been collaborating on this work prior to Stunkard's departure from Illinois, as suggested in his 1920 letter to Ward.⁴

It is difficult to ascertain Ward's motives in publishing his only paper on TBFs; and, more importantly, whether his dealings with Stunkard were honorable. In addition, was Stunkard justified in his ire at his mentor for publishing on a subject that Ward knew he was investigating? Ward warned him off publishing on TBFs

during Stunkard's student days at Illinois, indicating that the "subject was under investigation by others and not open to him."^{44,46} Who are the "others"? Based on what is available, "others" can only mean Ward, since none of his later students published on these worms. Ward may well have been saving this work for himself, since the discovery of parasites closely related to the human schistosomes in North American turtles would have been a major discovery. In addition, there is no evidence to support Stunkard's claim that he discovered these worms, since most of the specimens collected during his studentship that are on deposit in museums in this country were identified as having been collected by other students of Ward's, or with the collector unidentified as confirmed by the collection records available at the AMNH. Ward stated, on several occasions, that these worms had been under investigation and used in laboratories at Illinois for a number of years. Whether the work was done directly by Ward or his students, the specimens would have been considered Ward's under conventions prevailing at the time and his to do with as he pleased. Stunkard may have been involved in their collection at some point and recognized their importance; however, Ward may have viewed his participation as marginal and not worthy of authorship.

Stunkard continued his work on TBFs after taking a position at NYU in 1916 and collected additional specimens from turtles in the vicinity of NYC following his return from WWI (Stunkard, 1923). When writing to Ward in 1920,⁴ Stunkard indicated as much. Since he was no longer Ward's student, Stunkard would have been free, within the confines of scientific propriety, to work on whatever he liked. Ward was certainly aware of Stunkard's continued interest in TBFs, the collection of new material, and the progress Stunkard was making toward publication.⁷ If Ward were being honest in his assertion that he had submitted a manuscript for publication and withdrawn it to allow MacCallum's paper to appear first, he was behaving honorably toward an old friend. Unless additional information comes to light regarding Ward and Stunkard's relationship with respect to this subject, it is a tossup. As the head of the lab, Ward could assign projects to students, or reserve them for himself as he saw fit. However, if Stunkard were working collaboratively with Ward on these specimens prior to completing his degree and volunteering for military service, Ward's action could be viewed as disingenuous at best.

Did Stunkard behave ethically when he examined MacCallum's specimens of an undescribed TBF and then published his own description first?

Stunkard engaged in frequent correspondence with both MacCallums.^{1,8-11,16,17,20,21,37,39} Stunkard's graduate work (Stunkard, 1917) involved polystomatids and aspidogastrids, common parasites of turtles, which overlapped with G. A. MacCallum's efforts at the Zoological Society (MacCallum, 1918a, 1918b, 1918c). In addition, Stunkard almost certainly would have encountered *Heronimus chelydrae* (Digenea: Heronimidae) described by W. G. MacCallum (1902), as well as the TBFs that are the focus of the disputes between these investigators.

The earliest correspondence I have uncovered between Stunkard and the MacCallums was a reply¹ from G. A. MacCallum to Stunkard's apparent request to W. G. MacCallum regarding specimens of "worms" (their identity is not specified in MacCallum's response, but it was most likely *H. chelydrae*).

William G. MacCallum asked his father to reply, and his father wrote to Stunkard that his son had moved to Baltimore (to take a position at Johns Hopkins) and had donated his collection to the National Museum in Washington. George A. MacCallum invited Stunkard to visit him and review papers (presumably WG's) with good illustrations.¹ MacCallum also congratulated Stunkard on "returning [from WWI] with his whole skin." This suggests that MacCallum and Stunkard were familiar with each other, at least by correspondence, and had a cordial relationship.

In early November, 1919, Ward wrote to Stunkard after receiving MacCallum's paper that included the description of *Spirorchis*.² Ward expressed concern that the new work was not as good as "previous communications" and recommended that Stunkard study the paper and discuss his concerns directly with MacCallum in the hope that it might get him out of his "superficial rut," which might serve to improve MacCallum's future work.² Three months later Stunkard replied to Ward,⁴ apparently after a personal meeting with MacCallum, and agreed that the work was not well done. Stunkard confided that the drawings had been made by an illustrator from whole mounts, and none of the specimens had been serially sectioned. Stunkard stated that he had not been able to press him too hard, presumably due to the difference in their ages and relative status in the scientific community.

In the same letter,⁴ Stunkard indicated that he asked MacCallum to borrow the specimen of *Spirorchis* but was informed that it was lost. Stunkard recognized similarities between MacCallum's *Spirorchis* and specimens he was currently studying. Stunkard then asked Ward if he could erect a new genus for his specimens or, "from his [MacCallum's] meager and inaccurate description conclude that my specimens belong to *Spirorchis*, and accepting the name proceed to justify my acceptance because of certain similarities and then correct the generic characters." Stunkard obviously did not hold MacCallum's work in high regard and did not want to link his specimens to MacCallum's new genus. Finally, after sharing the progress of his work on TBFs with Ward, Stunkard asked his mentor if he would be interested in publishing his current work in the *Journal of Parasitology*.⁴ There is no record of a direct response to Stunkard's question; however, in early 1921 Ward wrote inquiring how Stunkard's work was proceeding; whether he had met with MacCallum; and what MacCallum might be doing as well.⁷

MacCallum (1922) published an abstract of a paper presented at the annual meeting of the AAAS held in Toronto, Canada describing a new TBF, *S. chelydrae*, from the heart of the snapping turtle, *Chelydra serpentina*. The new species was described as large, 8.5–9 mm long and 1 mm wide, and entwined in the wall of the ventricle, and possessing extensive esophageal glands that might secrete anticoagulant. MacCallum had mentioned the new species in a letter to Stunkard in late July 1921.¹⁶ This report must have struck a nerve with Stunkard as being similar to specimens he had under study. When Stunkard requested a loan of the material, MacCallum was hesitant to send them, since he had not published on them.¹⁷ MacCallum offered to send a sketch of the specimen, or if that were not sufficient, he invited Stunkard to visit and view the specimen. MacCallum also noted that Stunkard had not reciprocated by sharing his findings from snapping turtles. In the same letter, MacCallum thanked Stunkard for sending a copy of his blood fluke paper (Stunkard, 1921) and for correcting some of the errors

contained in MacCallum's original description of *Spirorchis*. In closing, MacCallum congratulated Stunkard on the birth of his son.¹⁷

Approximately 2 wk later, Stunkard received a letter from Roy Miner¹⁹ (editor of *American Museum Novitates*) with comments on his manuscript describing 2 new genera and species of TBFs, one of which is very similar to MacCallum's *S. chelydrae*. Miner suggested that Stunkard's paper would be strengthened if he were able to compare the 2 forms directly.¹⁹ Stunkard must have made an additional plea to MacCallum for the loan of the specimens, since letters from MacCallum indicate he sent the material²⁰ and requested its prompt return²¹ as he wished to publish on it. Stunkard's paper entitled "Two new genera of North American blood flukes" was published in the *American Museum Novitates* in May (Stunkard, 1922), which included *H. haematobium*, a form that MacCallum would deem identical to *S. chelydrae*, the material he had loaned Stunkard just months earlier.

Ward agreed that "the genus, if not the species of one of his [Stunkard's] new forms is identical to your *Spirorchis*," and "I find it totally impossible to understand how he could have written such a thing."²⁴ MacCallum²⁷ replied to Ward that he regretted his decision to send the specimen to "this man named Stunkard who begged of me 2 or 3 times to send the specimen." MacCallum was extremely upset to see what he viewed as a drawing of his *S. chelydrae* in Stunkard's 1922 paper with another name (*Henotosoma* and not *Spirorchis*) with Stunkard suggesting that MacCallum's "*chelydrae*" may be a different species in the genus *Henotosoma*. MacCallum apparently discussed the situation with researchers during his summer at Woods Hole²⁷ and shared that they "were disgusted that a man [Stunkard] would act in such a manner." It is clear that MacCallum felt that Stunkard had taken advantage of his generosity in rushing a paper into print ahead of his own.

Did Stunkard exploit of MacCallum? Clearly, Stunkard was already studying *Spirorchis/Henotosoma* and examining turtles around New York for additional specimens of these worms. The publication of MacCallum's abstract in early 1922 could have alerted Stunkard that MacCallum's *S. chelydrae* was similar to, if not identical with, the species he would later describe as *H. haematobium*. When Stunkard initiated his first request to see MacCallum's specimens, he had already submitted his manuscript to Roy Miner for consideration for publication in the *American Museum Novitates*¹⁹; however, Stunkard did not reveal that he had found specimens he deemed similar to MacCallum's *S. chelydrae*. Stunkard told Ward in 1920 that he had the work on 1 TBF nearly complete and was at work on another.⁴ I can only assume these were the species that comprised his 1922 publication: *Hapalorhynchus gracilis* and *Henotosoma haematobium*. Stunkard made his second request for MacCallum's specimens at the suggestion of Miner to strengthen the manuscript already under review. Since Stunkard's work on *H. haematobium* was nearly complete, he cannot be accused of the sin of commission (i.e., stealing MacCallum's discovery); however, he can be considered guilty of the sin of omission. MacCallum's generosity at minimum deserved an honest account of why Stunkard wished to borrow the specimens; i.e., he had a manuscript in review that contained the description of a new genus and species that he thought similar to the species described in MacCallum's abstract and needed to see the specimen for comparison. The lack of transparency on Stunkard's part cannot be seen as comporting to the highest

standards of scientific collegiality. Stunkard (1922) did provide a comparison between the 2 forms and noted MacCallum's generosity: "Although his final description had not yet been published he kindly loaned me the material for examination and comparison." Stunkard (1922) concluded his paper with the following: "The specimens [i.e., MacCallum's] examined manifest the features designated as characteristics of the new genus *Henotosoma* and should, I believe, be assigned to that genus. They are not, however, in my opinion specifically identical with *H. haematobium* and their completed description will be made by Dr. MacCallum." Stunkard may have felt this was sufficient acknowledgment as he left MacCallum the opportunity to describe his material as a new species.

MacCallum was not mollified by Stunkard's concluding remarks. In the same letter to Ward²⁷ MacCallum related that he was "upset to see a drawing of *S. chelydrae* with another name" and the suggestion that it belonged in Stunkard's genus *Henotosoma*. MacCallum indicated his frustration with taxonomic work in general based on his perceived ill-treatment by Stunkard and, presumably, the rejection of his work on the Congo material (see Stunkard, 1929). In a subsequent letter to Ward, he further opined that he might abandon plans to publish on other new taxa in his possession.²⁹ In yet another letter,³¹ MacCallum reiterated that he felt that he had been mistreated by Stunkard because he had shared his specimens and Stunkard had not reciprocated.

At this point, matters take an interesting turn. Ward replied²⁸ that he was disappointed with Stunkard's publication, but for reasons (unstated) that were different from MacCallum's. Ward praised MacCallum's contributions to the field, but felt that he was too close to the situation to arbitrate the issue and suggested an impartial mediator, possibly one of his former students, William W. Cort. MacCallum thanked Ward for his suggestion,²⁹ but did not think that Stunkard could be reasoned with "by half a dozen policemen." Ward sent MacCallum a long letter³⁰ outlining the history of TBF study at Illinois, including: (1) Stunkard's fascination with the group as a student, (2) Stunkard's suggestion to publish ahead of MacCallum's first paper, (3) the recall of Ward's paper on learning that MacCallum's paper was in preparation (or in press—it is unclear which), (4) Ward's inquiries about changing "*innominata*" back to "*eustreptos*," and (5) that *H. haematobium* and *S. chelydrae* were probably the same but their identity could not be determined without comparing the specimens.

Ward³⁰ felt that publishing MacCallum's paper (describing *S. chelydrae* as new) would only confuse the issue and recommended against going forward at that time. Ward suggested an outside arbiter and said that he had considered assigning "the problem" to one of his students to resolve but did not want to become personally involved. He suggested that MacCallum find someone in the Washington/Baltimore area (possibly Stiles or Ransom) to investigate the conflict. Ward wanted to restore the good relationship between himself and MacCallum but saw no benefit to "science" in making this dispute public. MacCallum dismissed the idea of engaging an independent expert to support his claim, calling the notion "absurd."³¹

For his part, Stunkard appeared oblivious to the problem. In 1923, he apparently wrote to MacCallum requesting the loan of some of the polystomes (Monogenea: Polystomatidae) MacCallum had described and was informed that they had been turned

over to the National Museum.³⁷ MacCallum took the opportunity to remind Stunkard of the earlier loan: “You remember the *Spirorchis chelydrae* which I sent you.” Additionally, MacCallum vented his frustration with Ward for not publishing his manuscript on his new species:

I sent a paper upon it to Ward for publication about May 1/1922. He has not published it yet nor has he returned the paper which I have requested. I don't know what to do with a man like that. Perhaps you can suggest some treatment as you know him pretty well.³⁷

In that moment, Stunkard went from adversary to ally—a curious turn of events.

This leads to the last major issue. MacCallum submitted a paper to Ward describing 2 new species of TBFs for publication in the *Journal of Parasitology* in May 1922. Ward held the paper for nearly 2 yr despite repeated inquiries about its status and requests for its return. Ward only returned the manuscript when confronted by Dr. W. G. MacCallum with the threat of a public inquiry into the matter.

What were Ward's motivations for neither publishing nor returning MacCallum's manuscript in a timely fashion?

The first intimation that MacCallum was working on a third TBF manuscript was in a letter to Ward on 17 March 1922.¹⁸ He requested that Ward publish a paper entitled “Two New Species of Spirorchidae” in the next issue of the *Journal of Parasitology*, and concluded with “An early assurance would greatly oblige.” This is an interesting request with 2 significant implications. First, it strongly suggests a friendly relationship between the 2 men. It is difficult to believe that MacCallum would make such a request of someone he did not know well and shared some degree of collegiality. Second, although MacCallum had published in a variety of journals (Supplementary Appendix 1), his request assumes acceptance of his work with little editorial oversight or interference. The first assumption is supported by correspondence between the 2 men; however, the second did not comport with how Ward managed his journal. Approximately 2 wk later Ward invited MacCallum to submit his manuscript²² but also stated that it would be assigned to the editorial board and that he did not have the authority to accept manuscripts unilaterally. Whether the latter was true or not is open to some speculation. After all, Ward owned the *Journal of Parasitology* and was the editor-in-chief and publisher. It is difficult to believe that he did not have considerable sway when it came to editorial decisions.

Nearly a month passed before MacCallum finally submitted the manuscript.²³ He apologized for the delay citing a family illness and stated that he hoped that there were not too many mistakes and that it “would help clear up the history of this interesting family of parasites.” The original manuscript is no longer extant (to my knowledge) but likely included the description of *S. chelydrae* from snapping turtles. At this point, Stunkard's paper describing the closely related, if not identical, *H. haematobium* was most likely complete, and possibly in press, since it was published in the *American Museum Novitates* a month later (Stunkard, 1922).

Near the end of May MacCallum must have written to Ward expressing his dismay that his article had not appeared in the issue

of the *Journal of Parasitology* he had just received. Ward²⁴ responded explaining that the issue (I assume this refers to Vol. 8 [4]) in question was already set in type when MacCallum's manuscript arrived. Ward assured MacCallum that his paper had been assigned to a member of the editorial board (the individual was not identified) and there was no decision on it at that time. Apparently MacCallum had seen Stunkard's paper on *Henotosoma* and commented on it to Ward. Ward had also seen Stunkard's paper and stated²⁴ “(I) confess I find it totally impossible to understand how he could have written such a thing.” This letter highlights MacCallum's unrealistic expectations regarding the publication of his paper. It also raises the question of Ward's ire at Stunkard. Ward knew Stunkard was nearing the completion of work on 1 or 2 TBF species and would publish on them. It is possible Ward thought he should have been a co-author on the paper and his anger was personal, or that Stunkard had indeed taken advantage of MacCallum's generosity in lending him his specimen of *S. chelydrae*, or the letter was disingenuous and designed to stay in MacCallum's good graces.

From the point of submission of the manuscript until its eventual return almost exactly 2 yr later, MacCallum wrote a number of letters^{31,33–35,38,40,41} to Ward inquiring about the status of his manuscript or requesting its return. During this period the elder MacCallum expressed increasing frustration at his manuscript being held in limbo. In late fall 1922 he wrote,²⁹ “if you will be good enough to have my worms published I will trust to a feeling of fair play on the part of those interested.” MacCallum wanted his discovery to be made available to the scientific community and allow them to assess his new species alongside Stunkard's. Three weeks later³¹ MacCallum made a similar plea that others should be able to see specimens collected by workers other than those from Illinois (meaning Ward and Stunkard). In 3 separate letters^{33–35} MacCallum requested/demanded the return of his manuscript, and in the last of these threatened to “use the best scientific people in the country to explain the whole transaction.” In a burst of exasperation MacCallum opined, “I am not aware I have done anything wrong . . . I am not going to be treated so, merely as I think because I am a Canadian.”³⁵ In his final letter, MacCallum expressed frustration with Ward stating “I have never had anyone treat me in such a manner before” and followed with “What under heaven is the reason for you to act so?”³⁸ Finally MacCallum made his demand clear,³⁸ “All I ask is that . . . you send me the paper & settle the matter.”

For his part, Ward repeatedly assured MacCallum that the manuscript was in the hands of the editorial board. In the early fall 1922, Ward wrote that he had just returned from doing summer research and was getting caught up with various administrative tasks.²⁶ In the spring of the following year Ward apologized for the continued delay³⁶ and stated that he was attempting “to secure and adjust a lot of information bearing on the subject which I propose to put at your disposal entirely without reserve in order that you may adjust some minor errors and make it of a character to command the attention that its importance deserves.” Ward closed by asking for a bit more time, and MacCallum's patience.³⁶ On 3 March 1924, Cattell's bombshell landed on Ward's desk with the threat of a public airing of the 2 yr delay leveled by W. G. MacCallum.⁴³ I can only surmise that this matter was taken seriously by Cattell because W. G. MacCallum held a prestigious position at the Johns Hopkins University School of Medicine and was a well-respected research

scientist (Longcope, 1944). His name would carry more weight in the scientific community than his father's.

Ward responded to Cattell a week later⁴⁴ stating that while MacCallum's paper had merit, it needed revision, and G. A. MacCallum had given Ward permission to proceed with the work. There is no direct evidence of either MacCallum's consent for Ward's intercession or the work done. Ward also indicated that "friends" in Washington and Baltimore had suggested that MacCallum was in his "dotage" giving the perception he might not be up to the task. Ward also shared that the paper contained some criticism of Stunkard and he wanted to avoid public controversy. Ward also asked Cattell to intervene directly with the younger MacCallum and to suggest that the 2 men deal directly in an attempt to avoid public scandal. Cattell contacted W. G. MacCallum, and apparently he agreed to withhold his complaint until the two could attempt to resolve the matter privately.⁴⁵

Three days later Ward composed a long letter to W. G. MacCallum restating the history of the interactions between himself, Stunkard, and the elder MacCallum.⁴⁶ Ward offered to print the paper in modified form without taking any credit for the work he had done, but excising the criticism of his former student. In a curious note, Ward wrote that he regretted "the work I was doing for your father did not reach a conclusion in time for him to pass judgement (sic) on it and to see it before he passed away." George A. MacCallum did not die until 1936, 12 yr later (Malloch, 1937). Equally curious, the son did not acknowledge, or correct, this rather grievous error in his subsequent correspondence with Ward.

William G. MacCallum was not impressed with Ward's explanation. In response the son wrote "Your letter throws very little light on the situation, but I am willing to forego the critical note I sent to Dr. Cattell, chiefly because I think such things undignified even though if we never make any public complaints, all sorts of injustices are condoned."⁴⁷ William G. MacCallum flatly stated that he wanted the manuscript returned so that he could revise it prior to leaving for India in late April. MacCallum stated that his father's paper was sent long before Stunkard's, and he wanted Ward to publish the paper with a definite statement that his father established the genus and described the new species, presumably *S. chelydrae* and *S. pictae*.

Ward finally returned the manuscript 2 wk later with a series of suggested changes that corresponded to numbers in the margins of the manuscript.⁴⁸ As the manuscript is, as mentioned earlier, no longer extant, the precise intent of Ward's suggestions is not always clear. The most important of these was the lack of any attempt to differentiate the new species from those already published. Specifically, Ward felt that restudy of numerous features of *S. chelydrae* was necessary to establish it as different from *H. haematobium*. Ward was also critical of MacCallum's failure to take into account the variability within species and the introduction of new names that almost certainly would fall into synonymy with those already published. Ward concluded his suggestions with the following:

No one would really do himself justice who published these data in the form in which they stand for further work on these forms is in progress and if statements which are published are evidently incorrect it will be necessary to say so. It was with this view that I urged your father to readjust the paper omitting the

uncertainties and expanding some of the descriptions so as to give permanent value to his publication.⁴⁸

The statement "further work on these forms is in progress" is interesting, as Stunkard (1923) had already published his major work on the group and, with the exception of 2 papers on related, but wholly distinct, genera (Stunkard, 1927, 1928), no other work on *Spirorchis* was forthcoming from Ward or his students.

Ward clearly did not feel the paper met his standards for the description of new taxa, and the errors he saw in the manuscript would result in embarrassment to the author when they were corrected by subsequent investigators. Clearly, the suggestions Ward made would require MacCallum (either father or son) to do significant additional work and completely rewrite the paper. Ward was fully within his rights, as editor-in-chief of the journal, to require any changes in a manuscript to meet the standards for publication. It is interesting that Ward never mentioned comments by any member of the editorial review board in his letter.

There was no reasonable excuse for Ward to delay a decision on MacCallum's manuscript for nearly 2 yr. It should have been accepted, sent back with suggestions for revision, or rejected in a timely manner. Why did Ward delay for so long?

It is difficult to believe that the paper was sequestered in order to allow Ward or Stunkard to publish their own papers and "scoop" MacCallum's discovery. Ward (1921) was published before MacCallum's paper arrived, as was Stunkard's first paper on TBFs (Stunkard, 1921). Stunkard (1922), which contained the description of *H. haematobium*, the form that rankled MacCallum most, was in press at or near the time the manuscript landed on Ward's desk and published 5 wk later. Both Ward and MacCallum were aware of Stunkard's publication within days of its appearance in print.²⁴ There was nothing to be gained by the overlong delay in evaluating and returning the paper.

The only conclusion that I can draw from the material at hand is that Ward wanted to find a way to salvage the publication for an old friend. The problem was that parasite taxonomy, primarily due to Ward's establishment of the graduate program at Illinois, had moved far beyond the approach that MacCallum, as a physician untrained in modern zoology, employed in his work. The methods Ward taught his students resulted in specimens that could yield much finer detail using whole mounts and light microscopy. If that were not sufficient to discern what was needed, specimens would be serially sectioned to reveal more intricate aspects of their internal anatomy. MacCallum was undoubtedly relying on techniques he learned either directly from his old friend R. Ramsey Wright in Toronto or indirectly from the same source, through his son, who was Wright's student. Ward was attempting, very successfully I might add, to put parasitology on a much more solid, scientific footing. MacCallum was working in the past.

If Ward set himself the task of rehabilitating MacCallum's paper, he failed miserably. Ward had numerous responsibilities that occupied a great deal of time and was well known for missing deadlines. I doubt MacCallum's paper would have been a high priority, and Ward was prompted into action only when threatened with litigation and/or scientific scandal.^{35,43,45} When W. G. MacCallum threatened to demand convening a panel of scientists to adjudicate the matter, Ward finally capitulated, made suggestions for "improving" the paper, and returned the

manuscript.^{43,46–50} What, if any, relationship Ward had with the MacCallums from that time on is unknown. It does not appear that this incident harmed Ward's reputation. He continued as Chair of Zoology at the University of Illinois until his retirement in 1933 and was elected Permanent Secretary of AAAS following his departure from academe.

Ward and Stunkard's opinions of MacCallum's work

From the available material, Stunkard expressed a much more negative view of MacCallum's published work than Ward. Ward's only comments on the quality of MacCallum's research were related to *Zoopathologica* 1(3–5). Ward wrote to Stunkard²: "This work is not up to the average of his previous communications. Perhaps the defect is due to haste in working over the matter or to his having undertaken to cover a larger field so that he had to discuss subjects with which he was not well acquainted." There is a sense that MacCallum had done work previously that was acceptable in Ward's estimation, but the current studies fell short. Stunkard was much less charitable.

Stunkard provided a brief history of MacCallum's career in his letter to Frank Etges in the early 1970s⁵¹ including the following:

Dr. G. A., a long retired physician, had no training in modern zoology, its techniques and procedures. A technician prepared his slides (most of which were pretty hopeless) an artist drew the figures and Dr. M. wrote the description from the artist's representation. The results were what could have been expected.

In his first publication in *Zoopathologica*, MacCallum (1916) provided evidence that this was not true. He stated that, "However imperfect the descriptions may be, the plates that are used are from *sketches made by the author* (my italics) from life and from mounted specimens in our collections, and we believe them to be as true to nature as it is possible to make them." So while MacCallum had a professional make the final illustrations for his publications, they were based on his own observations and preliminary drawings.

In addition, Stunkard commented unfavorably on the work that MacCallum did on parasites collected by the Lang-Chapin Expedition:

Also, in 1917, the American Museum turned over to Dr. MacCallum, with the assurance that his son would assist in the work, the parasitic worms collected by the Lang-Chapin Expedition to Africa. Note statement in my 1929 paper on this affair. . . . The report he did on the Lang-Chapin material was so hopeless that the Museum authorities discarded it as worthless. . . .⁵¹

Stunkard (1929) wrote, "Parasitic worms from the Congo were received at the American Museum in December, 1915. On February 23, 1917, they were entrusted to Dr. G. A. MacCallum, for study and identification. The work was never completed and in June, 1920, they were returned to the American Museum." Stunkard apparently was asked by Roy Miner to review MacCallum's paper on the cestodes and nematodes collected by the expedition and the reviewer's comments on the manuscript. In a letter to Roy Miner³² Stunkard wrote:

The careful and detailed criticisms [of the reviewers on the sections on nematodes and cestodes] show a superficial and inadequate character of those portions. The criticisms are deserved, they are well stated, and if the original work had been as carefully and thoroughly done, many of them would not be necessary.

MacCallum had completed his assignment, and it was found wanting by Stunkard and the experts assigned to review the paper.

Miner apparently asked Stunkard to review a manuscript on the trematodes from the expedition as well. Stunkard commented³²: "The manuscript is not suitable for publication and in my opinion can not (sic) be revised to make it so. The morphological work is so inadequate that there is no basis for revision." Later, Stunkard was asked to complete the project, and he did so (Stunkard, 1929; p. 234). In that publication he stated,

Certain observations and notes made by Dr. MacCallum were submitted with the specimens when they were returned to the American Museum. In the opinion of the authorities at the museum, Dr. MacCallum's unfinished report would not be helpful in the study of the material and consequently only the specimens were turned over to me. I have not seen Dr. MacCallum's account and the present descriptions are, therefore, entirely original and based on the specimens alone.

This statement is at least partially untrue. Stunkard did see MacCallum's work; however, I strongly suspect that none of MacCallum's work appeared in Stunkard's 1929 paper. It is clear that while Ward demonstrated respect and some sympathy for his colleague, Stunkard thought little of MacCallum's efforts.

George A. MacCallum was appointed to the position of Pathologist of the New York Aquarium in 1915 (Anonymous, 1916) at the age of 72. MacCallum's most prolific period was 1916–1921 when he published over 150 descriptions of new taxa or redescrptions of existing species of nematodes, cestodes, monogeneans, and digeneans in *Zoopathologica*, a journal established by the New York Zoological Society in 1916 (Anonymous, 1917) for articles that were not appropriate for *Zoologica*, the primary scientific journal of the society. Only 2 volumes of *Zoopathologica* were published, and MacCallum's work covered 295 of the 300 pages of the first volume, consisting of 8 issues published between 1916 and 1921. If *Zoopathologica* were not started specifically to publish MacCallum's work, it certainly appeared as if it were. I was unable to find any evidence of an editorial board for the journal, and it is quite possible that MacCallum's work was published with little, or no, editorial oversight, let alone sent to independent reviewers. This may explain his assumption of quick publication in the *Journal of Parasitology*.¹⁸

As indicated earlier, MacCallum had no formal training in zoological theory or practice. His concept of species would be considered anathema to many biologists at the time, but particularly to Stunkard. In a letter to Ward,²⁷ MacCallum stated with reference to *Spirorchis/Henotosoma*, "he [Stunkard] ought to know that each turtle has only the one genus or species of fluke in its blood, as far as I have observed." Stunkard, in a letter to Ward,⁴ supported this concept following a discussion

with MacCallum, “[he] concludes that the parasites of different hosts are, because of that fact, representatives of different species. This I am not at all willing to accept” In his letter to Roy Miner reviewing the Congo material,³² Stunkard complained that MacCallum “shows little knowledge of or regard for modern taxonomy or nomenclature, and apparently does not recognize any natural system of classification.” Time did not dim Stunkard’s opinion of MacCallum’s work.⁵¹

We must assume that G. A. MacCallum learned the basics of zoology and parasitology from his son, who studied under R. Ramsey Wright at the University of Toronto; however, W. G. MacCallum was first and foremost a pathologist trained in histology (Longcope, 1944).

An examination of the 5 papers where W. G. MacCallum was the sole or senior author (Supplementary Appendix 2) demonstrated his training in pathology. Specimens were sectioned and the anatomy reconstructed from sectioned material. All organ systems were described in exquisite detail at the gross, tissue, and cytological levels. When new taxa were described, differences from existing species were presented at a qualitative level with few measurements (MacCallum, 1895, 1899, 1902). Papers co-authored with his father (Supplementary Appendix 1) were similar in nature, with histology as the primary means of establishing the fine anatomy of the material.

George A. MacCallum’s approach to anatomy was quite different. In only 1 instance did I find reference to sectioning as a primary means of elucidating anatomical structure; *Cladorchis gigas* MacCallum, 1917, an amphistome that could not be studied as a whole mount due to the thickness of the body (MacCallum, 1917). From 1916 to 1921, G. A. MacCallum described or redescribed more than 150 species in *Zoopathologica*. The amount of material would have precluded the histological approach favored by W. G. MacCallum, and the father relied on whole mounts. The descriptions were brief, and there was no differential diagnosis or comparison with existing species.

Stunkard (1915) reviewed the species of *Telorchis* Lühe, providing compact descriptions of 6 new species described therein, and differentiated the new species from the most similar forms in what would now be the “comments” section of a taxonomic paper. I strongly suspect that Stunkard’s opinion of G. A. MacCallum’s approach to taxonomy was not improved by MacCallum’s comments in his paper “Notes on the genus *Telorchis* and other trematodes” when he wrote:

Stunkard . . . has given a fairly good general description of the anatomical structure of the genus [*Telorchis*] with variations noted in the various species. Perhaps in excessive detail, but nevertheless, such may be necessary on occasion (MacCallum, 1918a; p. 81)

Stunkard followed the same pattern in his subsequent papers on TBFs (Stunkard, 1922, 1923). While Stunkard’s descriptions and differential diagnoses were more qualitative than quantitative, he provided a more extensive set of measurements (ranges vs. a single specimen) to indicate variation within a species and produced the first key for *Spirorchis* (see Stunkard, 1923). Therefore, it would appear that Stunkard and MacCallum were at odds both philosophically and methodologically, although it appears that MacCallum was unaware of the divide. It also suggests that Ward’s observation,² “Perhaps the defect is due to

haste in working over the matter or to his having undertaken to cover a larger field so that he had to discuss subjects with which he was not well acquainted” was not far off the mark.

THE DENOUEMENT

None of the players in this melodrama rise to the level of hero or villain. The MacCallums were the most honest and above board of the 4 participants. George A. MacCallum can best be described as a naïf participating in a field of inquiry for which he was not properly trained, at a time when the discipline was moving in a direction he did not fully appreciate.

Born a generation before Ward, MacCallum was part of the era of the gentleman scientist, and gentlemen comported themselves with honor and dignity. MacCallum strove for scientific recognition of his work without realizing that it did not meet the standards acceptable to Ward for inclusion in the *Journal of Parasitology*. MacCallum displayed this sensibility by lending Stunkard his specimens of *S. chelydrae* before he had “published on them.” When confronted with what he perceived as Stunkard’s perfidy, there is no evidence that MacCallum challenged him directly, although he did complain to Ward, and others, about his student’s behavior. And finally, when MacCallum’s patience with Ward ran out over the failure to publish or return his manuscript, he enlisted Stunkard as an ally in attempting to understand Ward’s behavior.

MacCallum’s responses to Ward also demonstrate the behavior of a gentleman. His requests for either publication or return of his manuscript began in a moderate tone but gradually escalated over a period of a year. He threatened legal action, which was not repeated, and after falling back on discrimination based on his nationality, simply requested the return of his paper and to finally be done with the whole issue.

William G. MacCallum entered the affair as his father’s champion. It is difficult to determine why the son picked up the gauntlet at this point. It is possible that MacCallum senior suffered from ill health; after all Ward assumed he had passed away. Whatever the case, the son and father were very close, as evidenced by the son arranging employment for the father in New York when he was on the medical faculty at Columbia, and then moving together to Baltimore when W. G. MacCallum obtained a position at Johns Hopkins. William G. MacCallum enjoyed a stellar reputation in both medicine and science and would serve as a formidable champion in defense of his father’s reputation and honor (Longcope, 1944), a role that he played well. He achieved in a few weeks what his father was unable to accomplish in almost a year.

I do not believe that Stunkard saw anything wrong in his dealings with the elder MacCallum. When he requested the loan of specimens *S. chelydrae* from MacCallum, his manuscript had been submitted for publication, and he was acting at the suggestion of his editor to improve his paper by clearing up a potential loose end. Stunkard examined the specimens, determined they probably belonged to his new genus, *Henotosoma*, but were sufficiently different as to be a different species. He returned the material to MacCallum and noted his observations, and MacCallum’s kindness, in his paper. Stunkard should have confided to MacCallum the reason for the request and where he was in the publication process; however, Stunkard did not hold MacCallum’s work in high regard and probably did not want to

be associated with him professionally. Stunkard confided to a former student nearly 50 yr later, "I was young and struggling for scientific recognition"⁵¹; therefore, he would not have viewed linking his discovery to someone he did not respect as professionally beneficial.

Privately, Stunkard was extremely critical of MacCallum's taxonomic work; however, his critique was in line with other experts of the time. Apparently, at least 2 experts rejected MacCallum's manuscript on the nematodes and cestodes from the Congo Expedition, and Stunkard concurred when asked to assess the manuscript and the reviewer's comments. Stunkard felt that the paper on the trematodes was similarly flawed and did not recommend publication. This episode dealt a serious blow to MacCallum's confidence, as noted in a letter to Ward²⁷ where he stated that he had "about decided to give up his work after my treatment of the Congo collection." Reviewer anonymity is crucial to the peer review process. It is the role of the editor to bridge the divide between the reviewer and author and to ensure that reviewer comments are directed to the merits of the work and are not personal. In his comments to Roy Miner, Stunkard focused on the merits of the work and avoided personal attacks on the author. Stunkard's personal feelings regarding MacCallum were confined to a letter to a former student 50 yr later.

As editor-in-chief of the *Journal of Parasitology* it was Ward's responsibility to listen to the recommendations of his editorial board and communicate his decision to prospective authors clearly and directly. In this instance, I believe Ward let his personal feelings override his vision for the future of the discipline. A clear rejection of the paper as not meeting the standards of the journal would have been painful to the elder MacCallum. Why Ward was unable to render an honest opinion in this case is a mystery. He was, by his own admission, adverse to scientific controversy, but by dragging the situation on for nearly 2 yr, Ward raised the ire of both MacCallums and opened himself to the possibility of a public airing of the "scandal" and potential damage to his reputation in the scientific community.

Ward's dealings with Stunkard were, to say the least, puzzling. As I indicated earlier, TBFs were discovered in Ward's lab at Illinois. There is no record, other than Stunkard's own statements, to suggest that he was the first to find these intriguing parasites. Even if he had been, he was Ward's student, and Ward determined the projects for his graduate students. Ward claimed that he told Stunkard that this project "was not open to him" when he was a student, but evinced no concern when Stunkard wrote after leaving Illinois that he had been studying them and planned to publish on them. Why did Ward not mention in his correspondence with Stunkard that he (Ward) had a paper in press on these very same flukes? Ward was in the clearly superior position, as Stunkard noted.⁵¹ The power relationship was in Ward's favor. Why not just tell Stunkard the paper was in press, send him a copy, offer to compare notes to avoid a duplication of effort, and wish him well? Stunkard had no recourse in the matter. Ward's behavior is baffling.

In 1924, W. G. MacCallum stepped in as his father's surrogate, using his reputation in medicine and science to end the affair. And it ended quickly. In less than a month, the manuscript was returned and the son headed off to India. There are no letters extant between these individuals from that time on.

PUBLICATION OF MACCALLUM'S LAST TBF PAPER

The only remaining event in this saga was the publication of "Revue du genre *Spirorchis* MacCallum" in volume 4, issue 1 of *Annales de Parasitologie humaine et comparée* in 1926. The paper provided descriptions of 3 new species: *S. chelydrae*, *S. pictae*, and *S. blandigii*. *Spirorchis eustreptos* MacCallum, 1921, and *S. emydis* MacCallum, 1921, were redescribed. It is impossible to know how this publication compares with the manuscript MacCallum submitted to the *Journal of Parasitology*. The original title implied the description of 2 new species of *Spirorchis*. I would assume that one was *S. chelydrae*. The redescription of type species of *Spirorchis* and attempted resurrection of the originally intended name "*eustreptos*" was certainly not included in the original. This publication was intended, in my opinion, to right all of the perceived wrongs MacCallum had suffered at the hands of Ward and Stunkard. There is no evidence that MacCallum heeded any of the suggestions provided by Ward. He did follow Stunkard's suggestion that *S. chelydrae* was not identical to *H. haematobium*; however, he did not consider it congenic yet offered no defense for his decision. With regard to *S. chelydrae*, MacCallum (1926; p.102) noted:

Stunkard described under the genus name of *Henotosoma* a worm that came from *Chelydra serpentina*. However, he examined the specimens that were used for this description and recognized that they differ from the one that he encountered.

It is interesting that after all of the travails of the previous 4 yr, MacCallum never stooped to invective. He described his "forms" and let the past alone. However, Ward's admonitions to W. G. MacCallum were prophetic. While the entire effort may have soothed the father's wounded ego, from a personal perspective, it was all for naught. Four of MacCallum's 5 species are now considered junior subjective synonyms, and only *S. innominata* is presently accepted. None bear MacCallum's name as the taxonomic authority.

Dr. George A. MacCallum was caught in the unfortunate situation of being in the wrong place at the wrong time. He undertook studies for which he was not trained, and he was unwilling to adapt to the changing standards that were emerging in the field of parasitology. TBFs were under investigation by 2 knowledgeable, talented, and ambitious scientists who were at the forefront of transforming the discipline. While neither Ward nor Stunkard committed any ethical breach in their dealings with MacCallum, Ward's misguided attempt to salvage a manuscript that did not meet the standards of the discipline as he defined them, and by extension his journal, set the stage for a series of misunderstandings and suspicions that almost led to the type of scientific controversy that Ward so desperately wanted to avoid.

60 YEARS LATER

There was no mention of these events in the scientific literature for over 60 yr. In 1984, at the age of 95, Horace Stunkard published a paper (Stunkard, 1984) entitled, "The genus *Spirorchis* MacCallum, 1918 and Family Spirorchidae Stunkard, 1921 (Trematoda)," where he reviewed events that occurred over

half a century earlier. The principle reason for this paper was to correct 2 perceived errors that appeared in the literature: 1 which Stunkard viewed as personal, and 1 dating back to the original episode.

Stunkard (1921) proposed the suprageneric taxa Spirorchidae and Spirorchinae to replace Proparorchidae Ward, 1921, and Proparorchinae Ward, 1921, when Stunkard placed *Proparorchis* Ward, 1921, in synonymy with *Spirorchis* MacCallum, 1918. MacCallum (1921) proposed the names Spirorchidae and Spirorchinae, which were published several months after Stunkard's paper appeared. Stunkard was regarded as the author of the family and subfamily of TBFs based on priority, although his original spelling was modified as noted earlier (however, see Platt 2002). Yamaguti (1975) credited authorship of these names to MacCallum, and Stunkard would not let that transgression stand.

The second issue was Stunkard's attempt to validate MacCallum's *S. eustreptos* as the name for the type species of the genus over Ward's *S. innominata*. According to Charles W. Stiles (see Stunkard, 1984: 349), then Secretary of the International Commission for Zoological Nomenclature, "The first specific name that is published after the generic name becomes available and becomes the type of the genus." Stunkard (1984) claimed that "Ward implied, but did not make the combination, *Spirorchis innominata*." Stunkard (1984) concluded that this validated *S. eustreptos* MacCallum, 1921, as the type species of the genus, and *S. innominata* Ward, 1921, should be treated as a junior synonym. Stunkard was mistaken. Ward (1921: 123) specifically stated, "In order to insure accuracy of reference, I would suggest this species be designated *Spirorchis innominata*." There was no ambiguity in Ward's action. He clearly made the combination, and *S. innominata* is the type species of the genus. In Stunkard's last major work on TBFs (Stunkard, 1923: 172) he stated "The disagreement between these two investigators is regrettable, but since *innominata* was the first specific name to be published *after* (my italics) the generic name *Spirorchis*, the rules of priority sustain its validity." Stunkard (1984) is a clear, concise review of the facts that occurred between 1919 and 1926 involving these 3 scientists. He was quick to exert the priority of his claim to the authorship of the family and subfamily names for TBFs; however, the refutation of his original conclusion that *S. innominata* had priority over *S. eustreptos* raises the question: Was this simply an honest error by someone in his "dotage," or the final act in a long simmering feud dating back 60 yr?

CODA

Why should this episode be of interest, and what do we learn from making it public? Henry Baldwin Ward and Horace Wesley Stunkard are legends of the field. And yet, we know little about them beyond their scientific contributions and achievements. No biographer has seen fit to chronicle the life of any American parasitologist. Most of us learned long ago that public personas only reflect what an individual wants us to see. Yet it is the complexity of an individual's personality that renders them interesting characters in the comedy and drama that is their life. What I have attempted to do is to humanize these 4 luminaries of early parasitology. I am not a professional historian, and the material I have uncovered is limited. Someone else reading the

same letters and publications might arrive at different conclusions. The discovery of new information could diametrically alter our perceptions of these individuals and events. I find these people infinitely fascinating and their lives and motivations worth knowing more about—for better or worse. It is my hope that this paper may inspire someone with more talent, skill, and perseverance to investigate the founders of our discipline and provide a deeper understanding of these incredible individuals.

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LETTERS CITED AND DEPOSITED AT HAROLD W. MANTER MUSEUM

There are photocopies of all letters referred to in the text. Not all letters are cited in the text. George A. MacCallum's letters are handwritten, and my transcriptions are included as well. Some of the original letters may be found in the Archives of the Library of the American Museum of Natural History, New York, New York. The location of the letters Ralph Lichtenfels used to make these copies is unknown.

- (1) 7 April 1919: G. A. MacCallum to H. W. Stunkard
- (2) 6 November 1919: Ward to Stunkard
- (3) 6 November 1919: Ward to MacCallum
- (4) 2 February 1920: Stunkard to Ward
- (5) 20 February 1920: Stunkard to Stiles
- (6) 1 March 1920: Stiles to Stunkard
- (7) 27 January 1921: Ward to Stunkard
- (8) 7 May 1921: MacCallum to Stunkard
- (9) 8 May 1921: MacCallum to Stunkard
- (10) 14 May 1921: MacCallum to Stunkard
- (11) 28 May 1921: MacCallum to Stunkard
- (12) 2 June 1921: MacCallum to Ward
- (13) 6 June 1921: MacCallum to Ward
- (14) 18 June 1921: Bayard H. Ransom to Ward
- (15) 24 June 1921: Ward to Ransom
- (16) 29 July 1921: MacCallum to Stunkard
- (17) 2 March 1922: MacCallum to Stunkard
- (18) 17 March 1922: MacCallum to Ward
- (19) 17 March 1922: Roy Miner to Stunkard
- (20) 24 March 1922: MacCallum to Stunkard
- (21) 28 March 1922: MacCallum to Stunkard
- (22) 28 March 1922: Ward to MacCallum
- (23) 13 April 1922: MacCallum to Ward
- (24) 29 May 1922: Ward to MacCallum
- (25) 18 September 1922: MacCallum to Ward
- (26) 30 September 1922: Ward to MacCallum
- (27) 2 October 1922: MacCallum to Ward
- (28) 4 October 1922: Ward to MacCallum
- (29) 21 October 1922: MacCallum to Ward
- (30) 7 November 1922: Ward to MacCallum
- (31) 14 November 1922: MacCallum to Ward
- (32) 28 November 1922: Stunkard to Miner
- (33) 29 December 1922: MacCallum to Ward
- (34) 22 March 1923: MacCallum to Ward
- (35) 10 April 1923: MacCallum to Ward
- (36) 13 April 1923: Ward to MacCallum
- (37) 12 May 1923: MacCallum to Stunkard
- (38) 15 May 1923: MacCallum to Ward
- (39) 26 May 1923: MacCallum to Stunkard
- (40) 26 May 1923: MacCallum to Ward
- (41) 20 June 1923: MacCallum to Ward
- (42) 14 January 1924: Stunkard to Miner

- (43) 3 March 1924: Cattell to Ward
- (44) 10 March 1924: Ward to Cattell
- (45) 14 March 1924: Cattell to W. G. MacCallum
- (46) 17 March 1924: Ward to W. G. MacCallum
- (47) 29 March 1924: W. G. MacCallum to Ward
- (48) 12 April 1924: Ward to W. G. MacCallum
- (49) Undated (between 12 & 21 April): W. G. MacCallum to Ward
- (50) 21 April 1924: W. G. MacCallum to Ward
- (51) Undated (early 1973 \pm 2 yr): Stunkard to F. J. Etges
- (52) Reminiscences of Mr. and Mrs. William Walter Cort: oral history, 1966. University of Illinois Archives. (<https://cliocolumbia.edu/catalog/4074117> for information on the location of the original document, accessed 28 October 2016).
- (53) Collection records of TBFs on deposit at the American Museum of Natural History, New York, New York.