PAPERS READ.

A VIVIPAROUS AUSTRALIAN PERIPATUS (*P. LEUCKARTII*, Saeng.)

By J. J. Fletcher, M.A., B.Sc.

For some years past a species of Peripatus has been known to occur in New South Wales; and no one has ever said of it that after studying Sedgwick's full description of *Peripatus leuckartii* he was fairly certain that it did not belong to that species, but to a new one. On the contrary, no one has ever called it, or proposed to call it, by any other name than *P. leuckartii*, Säng. Further, on the *ipse dixit* of Dr. Dendy himself it is to be called *P. leuckartii*; for in two recent papers he quite authoritatively says that *P. insignis* is "the only other known Australian species": but *P. leuckartii* has fifteen pairs of walking legs, and *P. insignis* has fourteen pairs; and no Peripatus with other than fifteen pairs has hitherto been recorded from New South Wales. Now this New South Wales Peripatus, which even according to Dr. Dendy is *P. leuckartii*, and which has never been otherwise designated, is not only as viviparous as *P. capensis*, for example, but there has not been, since the year 1888, the slightest room for any doubt on the subject, for, among others, the simple and sufficient reason that the very first specimen of it that was ever opened, in the month of July, 1888, proved to be in the same interesting condition as the first specimen of *P. capensis* dissected in 1873 by Moseley, who says that on opening it he "found the animal to be viviparous, and full of far-advanced embryos." Nor is this mere assertion on my part, as I shall presently show, for one of the Australian Peripatus embryos was preserved by Dr. Haswell, who gave it to me in October, 1888, and it has remained in my possession ever since. This embryo is approximately at the same stage of development as one of Moseley's advanced Cape embryos just referred to, and, allowing for the specific difference

in the number of legs, it is very fairly represented by his figure thereof (Phil. Trans. Vol. clxiv, pl. LXXV, fig. 3).

Moseley's observation is now nearly twenty years old, but to this day the correctness of his conclusion is undisputed. Therefore, in the case of the Australian specimen which in July, 1888, I gave to Dr. Haswell, who a few days later found it to be full of far-advanced embryos, told me of his experience, promised me one of the embryos, and a few weeks later fulfilled his promise, it is not at all clear to me what other conclusion any sane individual could possibly have arrived at under such circumstances than that it, too, was viviparous; or, this being so, what there was about this simple fact in any way more remarkable or in any way affording better cause for undue excitement and exultation than that John Gould or his predecessors should have actually found that Australian birds, like birds in other countries, were unquestionably oviparous.

Moseley calls such a specimen as that he refers to, a pregnant specimen; and I have said of the Australian specimen in question that on dissection it proved to be pregnant, as anyone will see on turning to the Proceedings of this Society for 1888 [Vol. iii. (2nd ss.), Part 2, p. 892, footnote]; and as Dr. Haswell, who made the dissection, is, I am glad to say, still in Sydney, I need not enlarge on the subject of the agreement of the statement with the facts; it suffices to say that not only had a pregnant specimen been met with as far back as the year 1888, but that the fact is on record.

And this was only the first of a series of experiences, each by itself sufficient to establish the undoubtedly viviparous nature of the Peripatus with which we had to deal, and which has never been called anything but *P. leuckartii*. But even so, what was there to make a fuss about? No unprejudiced critic can deny that to anyone of the stamp of O. W. Holmes's youthful correspondent, "who longed to leap at a single bound into celebrity," there certainly was here presented an opportunity of gaining, if not celebrity, at least a little cheap notoriety, or, failing that, an inexpensive method of putting himself abundantly *en évidence* on very slight provocation. Otherwise, and as Peripatus was viviparous all along the line, and the Australian *P. leuckartii*

simply and naturally came up into line, there was just as little need to rush into print with sensational announcements about it as there is for an ornithologist who finds the previously unknown eggs of an already described bird, or a previously undescribed bird and its eggs, with a flourish of trumpets to flood the scientific journals with announcements of a new and rare discovery. A brief but correct record of the matter was made for future guidance; and that was sufficient.

At this time Dr. Dendy and the Australian Peripatus were strangers and had not met; one could not therefore be expected to provide against such a contingency as that on July 31st, 1891, a Victorian naturalist should arise and say with an emphasis which quite settles the matter, that *Peripatus leuckartii*, the common 30-legged Peripatus of Eastern Australia, is not viviparous at all, that it differs widely in this respect from all other known species, and that before the date mentioned nobody knew anything whatever about its mode of reproduction, or as he puts it, "Hitherto [*i.e.*, prior to July 31st, 1891] little has been known of its habits, and nothing of its mode of reproduction"; in reply to which I may say that, as regards the New South Wales Peripatus, at least, while all this is both entertaining and amusing, the Victorian naturalist in question seems to have arrived a little late on the scene, and to have got off the track and to have lost himself *en route*, because there is no difficulty whatever in proving, even to his satisfaction, that the New South Wales Peripatus was viviparous in 1888, that it is still viviparous in 1892, and that in the interval it was also viviparous; or that it does not differ, and within the period mentioned has not differed, from extra-Australian species in respect of its viviparity.

In four recent papers* [Nature, Sept. 17th, 1891; Victorian Naturalist, Sept., 1891; Proc. Roy. Soc. of Victoria, Vol. iv. n.s.

* These are severally entitled: "An Oviparous Species of Peripatus" [the only Australian species referred to in the text being *P. leuckartii*]; "The Mode of Reproduction of *P. leuckartii*"; "On the Oviparity of *P. leuckartii*"; and "The Reproduction of *P. leuckartii*." In two of them *P. insignis* is referred to as "the only other Australian species" or "the only other known Australian species."

p. 31; and Zoologischer Anzeiger, December 28th, 1891] Dr. Dendy has announced the discovery that *P. leuckartii*—meaning thereby any Australian Peripatus which is not referable to the 28-legged *P. insignis*—is oviparous, that until he made this discovery nobody, more particularly myself,† knew anything about its mode of reproduction, and that it appears from my observations that the young are hatched in October. If all or any of this be correct, then of course the object given to me by Professor Haswell and referred to above as an embryo, is not and cannot be such, but it must be considered to be a yolk granule—a yolk granule with a pair of rudimentary antennæ, and fifteen pairs of developing walking legs, but only a yolk granule, however remarkable, nevertheless! For since Dr. Dendy describes the deposited eggs of *P. leuckartii* as consisting of "milky fluid contents containing very many yolk granules, but with no appearance of an embryo," it is obviously impossible that advanced embryos could be present in younger (intra-uterine) ova of such an animal.

Clearly, therefore, Dr. Dendy would have done well either to have confined his remarks entirely to the mode of reproduction of the Victorian Peripatus, or else to have been quite sure of his ground. Because as set forth in his four papers Dr. Dendy has committed himself to definite statements about *Peripatus leuckartii* which when applied to the New South Wales Peripatus are simply preposterous; and when they are applied to the Victorian Peripatus are found, in view of subsequently ascertained facts, to be in need of so much limitation and qualification that when they come to be soberly restated in a modified form they may well be excused from knowing themselves when placed beside

† In three of Dr. Dendy's papers I am referred to as "the only observer, so far as I am aware, who has said anything of its [*P. leuckartii*] life-history." Of course I knew nothing, because prior to July 31st, 1891, "nothing [was] known of its [*P. leuckartii*] mode of reproduction"; what there was to know was that *P. leuckartii* was oviparous and differed widely, &c. I have never said a word in the past on the subject of the life-history of any but N.S.W. specimens of *P. leuckartii*; and what I said about these was quite in order.

the somewhat inflated and pretentious originals. And the clue to what has happened may be offered in a few words.

Both Hutton and Sedgwick—the former as long ago as 1876—had found that sometimes the New Zealand Peripatus deposited eggs, and being cautious naturalists and duly mindful of a certain time-honoured wise saying—which a recent observer has conclusively shown to be every whit as applicable to the Victorian Peripatus as to the ordinary barn-door fowl—they did not commence operations by straightway proceeding to count the chicks—or at least not aloud and in print—on the very day on which the eggs were found some months in advance of the date at which even on a very moderate estimate, and under the most favourable circumstances possible, the young could be expected to hatch, if indeed that were to happen at all: on the contrary, they first waited to see what happened, and then talked, not about what they had expected to happen, but what they actually found to have happened; and so Hutton says "Although viviparous, the eggs are often extruded before development is complete; but these always die" [Ann. Mag. Nat. Hist. (4) 1876, XVIII, p. 362], and Sedgwick in his Monograph on Peripatus says he can corroborate Hutton. This, it might not unreasonably be expected, would be enough to put subsequent egg-finders on their guard about discussing with confidence—in print at any rate—the possibilities of such eggs before, instead of after, the hatching of the young. Now, on July 31st, 1891, Dr. Dendy found a batch of Victorian Peripatus eggs—the only Australian Peripatus eggs anybody has ever met with—and two of his papers about them are dated July 31st, not 1892 but 1891, a third was read on August 10th, 1891, and the fourth on August 13th, 1891, but bears a postscript of date September 4th, 1891; whereas the eggs at the very earliest were not expected to hatch before the end of October, and even at that particular early period on quite erroneous grounds. Moreover, no one of them contains any reference whatever to the experiences of Hutton and Sedgwick with the eggs of the New Zealand Peripatus; and Dr. Dendy argues as if the eggs found by himself were the only Peripatus eggs ever met with, as if he knew for certain that they were

fertilised ova, and bound to hatch "at the end of October,"—for though I knew nothing about the mode of reproduction, Dr. Dendy shows to his own satisfaction that my observations, which have reference solely to a viviparous Peripatus, supplied the finishing touch to his splendid generalizations on the oviparity of *P. leuckartii*—and as if the N.S.W. Peripatus was not, and could not possibly be viviparous; consequently some new and remarkable conclusions are arrived at, and as so often happens under such circumstances, the new turns out not necessarily to be all true, because, in spite of Dr. Dendy's discoveries, among other things, the New South Wales Peripatus is viviparous, and when the Victorian Peripatus does lay eggs in July, not only are the young not hatched therefrom "at the end of October," or anywhere near that date, but at present, as far as I can learn, no one is bold enough to affirm that he ever knew a single instance in which young ever did hatch from such eggs.

If the Victorian Peripatus really is oviparous, then it is oviparous, and when the matter is settled nobody can raise any objections to its being so: in that case also the mode of reproduction of the Victorian Peripatus will certainly differ from that of the New South Wales Peripatus, and if such be true, no valid objection to that can be raised; indeed perhaps certain cynics, on other than biological grounds, might be disposed to aver that if the N.S.W. Peripatus certainly were one thing, that in itself would be full and sufficient reason why, on principle, the Victorian Peripatus should be something else as widely different as possible; but with such we are not now concerned. Dr. Dendy's modest claim is not, however, merely that he has proved that the Victorian Peripatus is oviparous, but that the common 30-legged Australian Peripatus wherever it occurs is so; and that until he shared his discovery with the world, he alone of all mortals knew anything of its mode of reproduction. To this it may be objected that Dr. Dendy's announcements were premature, and that in part they were based on the erroneous supposition that *P. leuckartii*, as it occurs in New South Wales, is not viviparous; that if the oviparity of the Victorian Peripatus were eventually established, not even then would Dr. Dendy's statements about

the mode of reproduction of the supposed oviparous *P. leuckartii* still apply to it without modification; that the statement or implication that *P. leuckartii* is oviparous cannot be allowed to pass muster until it is shown either that the New South Wales Peripatus is not viviparous, or that it cannot correctly be referred to that species; and that the wide difference in the mode of development of *P. leuckartii* as compared with all other known species is not proved, since the N.S.W. Peripatus is viviparous, and in the case of the Victorian Peripatus, if the wide difference consists in this that "the young are hatched at the end of October," that wide difference has now vanished, while if it be that eggs were once deposited, then on the same grounds Dr. Dendy should have stated that the New Zealand Peripatus was sometimes oviparous. Hence, under any circumstances whatever, explanations and restatements are necessary.

And as Dr. Dendy does not now for the first time hear that *P. leuckartii* as it occurs in New South Wales, is indisputably viviparous, and does not in its mode of reproduction differ widely from all other known species, and that there has never been any reason to suppose otherwise, it would have been just as well if an early opportunity of making the necessary modifications and of setting matters straight, had been found, because already his unmodified statements are finding their way into the records of zoological literature, and confusion and misapprehension must necessarily result. For example in Part i. of the Journal of the Royal Microscopical Society for 1892, recently to hand, there is (p. 37) an abstract of one of Dr. Dendy's papers, and it there occurs this wondrous statement, a perfectly legitimate deduction by a recorder whose bona fides is not to be questioned: "The eggs [of *P. leuckartii*] appear to be laid in or about July, and the young are hatched at the end of October." As a joke, or even as a fairy tale, this is, of course, perfectly admirable, because—and we may here leave the viviparous N.S.W. Peripatus entirely out of consideration for a moment—there must be a considerable number of individual specimens of Peripatus within the territory of Victoria, where, we are told, Peripatus is not an uncommon constituent of that section of the invertebrate fauna which lives out of sight

during the day time; and if only a fair proportion of the adult females lay their eggs in July of any given year, and if at the end of October following only a fair proportion of young are hatched therefrom—and we have it on high authority that the eggs are laid in July, and that the young are hatched at the end of October—it follows that except perhaps in very unfavourable years there ought annually to be a large accession to the Victorian Peripatus fauna just about October 31st: yet if the entire human population of Victoria were to turn out *en masse* and for a period of one month, six weeks, two months, and for how much longer we have not yet been told, dating from November 1st, were to devote themselves enthusiastically and exclusively to a search, over the whole area of the colony of Victoria, for the young of the Victorian Peripatus just hatching or newly hatched from eggs laid in July previous, the enthusiasts would find themselves engaged in a quest not less fruitless than if the same amount of time and energy had been given to the acquisition of specimens of the famous Australian bunyip. There are no bunyips to be captured in the Australian bush nowadays, neither at the time and under the circumstances mentioned are there any newly hatched young of *P. leuckartii*, for the latter are then as intensely "cryptozoic" and as altogether non-existent as the former. Then what a beautiful instance of unerring skill in forecasting the future, and in being able, at the first time of asking and on such slender evidence, to fix so precisely, not on the beginning nor on the middle, but on the end of October as the time when the impossible happens, is presented in the passage quoted; what an innocent-looking pitfall for the unwary—writer of a textbook it may be; and what a splendid chance of supplementing the catalogue of topsy-turvy biological and other arrangements prevailing at the Antipodes, given by the late Mr. Barron Field who says, "But this is New Holland . . . . where the kangaroo, an animal between the squirrel and the deer, has five claws on its fore-paws, and three talons on its hind-legs, like a bird, and yet hops on its tail; . . . . where the pears are made of wood, with the stalk at the broader end; and where the cherry grows with the stone outside" (pp. 461-462)!

And therefore viewing the matter in a serious light, and leaving misleading analogies and groundless expectations out of sight, and having regard only to the simple truth, what can be said of the latter clause at least of the above-quoted passage than that it is simply an exploded fable, a delusion and a snare? For, taking the passage as a whole, and as it stands, to what known Australian species of Peripatus is Dr. Dendy prepared to maintain that it can be truthfully applied? In other words, is it intended to be sober truth embodying the latest contribution to a knowledge of the life-history of the viviparous N.S.W. Peripatus, which Dr. Dendy says is oviparous, which has never been known to lay eggs in July, or to that of the Victorian Peripatus, whose young have never been known to hatch at the end of October or thereabouts? For one of the most important results arrived at by Dr. Dendy, so far, and at a date subsequent to that on which each of his four papers was written, is that the eggs found by him on July 31st—the only known Australian Peripatus eggs so far known—the possession of which on that date enabled him to prove so much, among other things, that *P. leuckartii* as it occurs in N.S.W. was certainly oviparous, utterly failed to come up to expectations, and that the young did not hatch therefrom "at the end of October"; for it appears from the Presidential Address of Professor Baldwin Spencer delivered in Section D at the Tasmanian Meeting of the Australasian Association for the Advancement of Science, on January 9th, 1892, in which the Peripatus eggs in question are referred to, that at that time [or to allow for a small margin let us say up to December 31st] they were still only in course of development, and he adds "that the embryos will apparently soon be hatched out." Hence "at the end of October" is clearly an impostor, and may as well be thrown overboard once and for all.

Hutton and Sedgwick met with New Zealand Peripatus eggs, and they found that young did not hatch therefrom. Dr. Dendy on July 31st found Australian Peripatus eggs, and though on that date he knew exactly what would happen on or about October 31st, still up to December 31st he seems to have found himself pretty much in the same position, or at least in a position of extraor-

dinarily deferred expectation, viewed from the confident standpoint of July 31st.

The expected young may subsequently have hatched, or they may not have hatched, or they may yet hatch, or they may never hatch at all ; I cannot find any reference to the subject of later date than Professor Spencer's Address, of which he has recently very kindly sent me a copy. But whatever has happened or may happen in this matter, is quite immaterial just now, for I am not directly concerned with the mode of reproduction of the Victorian Peripatus, nor is it a subject on which in the past I have ever said a word. What we are directly concerned with at present is that the beautiful myth that the young of *P. leuckartii* "are hatched at the end of October" from eggs laid in July previous, has now received a well-merited quietus at Dr. Dendy's own hands ; and with it also the altogether fabulous Australian Peripatus—which would have been such a treasure to Mr. Field —whose young complete their development after deposition of the eggs in which there is no sign of an embryo, in the astonishingly short period of from three to four months—or, say, from July 1st to October 31st.

That on Mt. Kosciusko at such an elevation as 5700 feet, at which *Peripatus leuckartii* was found by Mr. R. Helms, Peripatus should lay its eggs in what we may call almost mid-winter, and that the eggs should hatch at the end of October, when some at least, if not the greater part, of this period would certainly be included in the months to which Mr. Helms refers when he says that "it must be remembered that this locality for at least from four to five months [in the year] is frequently covered with several feet of snow," and where even as early as 19th March Mr. Helms says he experienced frosty nights, would be on the face of it so extravagantly improbable—unless the development of the eggs of an oviparous Peripatus can steadily proceed at a temperature of about freezing point or lower—as never to have been worth serious consideration. And not less improbable, except with the same limitation, would it be of *P. leuckartii* at an elevation of over 3000 feet on the Blue Mountains, at which I myself have found it.

And if it be asked why the month of October should have been imported into the matter at all, any one of Dr. Dendy's four papers will supply an answer. This is one of them : "It thus appears that *P. leuckartii* lays eggs in July or thereabouts ; and it appears also, from Mr. Fletcher's observations, with which it will be seen that my own fit in very well so far, that the young are hatched at the end of October" (Proc. R.S. Vict. iv. (n.s.) p. 33). This, it is hardly necessary to state, is entirely Dr. Dendy's own version of the matter, and in flat contradiction to my experience and statements ; and I wholly repudiate any connection with it. I never irrationally supposed that the young specimens met with by me in October, 1888, were hatched from eggs laid by an oviparous animal some months before, I do not believe so now, and I have never made any statements which could possibly lead, or rather mislead, Dr. Dendy or any one else to suppose so. Quite the contrary ; what I said was that of two females once in my possession, one on dissection proved to be pregnant—a perfectly correct use of the term sanctioned by so good an authority as Moseley—and that the other died shortly after giving birth to four young ones, which I exhibited at a meeting of this Society in October, 1888. My statements I can fully and convincingly justify ; but Dr. Dendy has just as fully and convincingly shown the absurdity of his own conclusions respecting them by himself proving, firstly, that my observations when they are not misrepresented so far from fitting in very well with his own are diametrically opposed to them ; and secondly, that when the Victorian Peripatus does lay eggs in July, young are not hatched therefrom "at the end of October" or anywhere near that date.

Moseley was the first to announce that Peripatus was viviparous ; and as he unhesitatingly stated this to be the case, it is important to consider for a moment the evidence on which he relied, because at the time his classical paper was written he clearly did not know the month in which the young were born, he had not witnessed the birth of the young, and he had never even seen the newly born young ; and it is equally clear that it was not possible for him to have known the one or seen the others. What he says on these points is : "The breeding-period of

P. capensis is thus probably the months of November, December and January, the three Cape summer months. Observations are required on the mode of congress of the sexes, and on the time and manner of the birth of the young" (p. 766). The subsequent investigations of Sedgwick established the fact that the young of *P. capensis* are born in April and May (Monograph, p. 165); Moseley's stay at the Cape in H.M.S. "Challenger" lasted from October 28th to December 17th, 1873, and his paper (Phil. Trans. Vol. clxiv. p. 757) is marked "received April 9, read May 21, 1874." His own words on the subject of viviparity are: "*Peripatus* was naturally the first animal sought after by the naturalists of the 'Challenger' expedition on their arrival at the Cape of Good Hope, and I was lucky enough to find a considerable number of specimens on the very first occasion of searching for them. My intention had been only to try to keep the animals alive, so as to obtain their eggs and watch their development, but on opening one large specimen I immediately recognised the presence of tracheæ, and found the animal to be viviparous and full of far-advanced embryos" (l.c. p. 757). In this passage it is noticeable that Moseley speaks of his finding the animal to be viviparous before he mentions embryos. From "Notes of a Naturalist on the 'Challenger'" it further appears (p. 161) that the specimen referred to was the first specimen met with. Moseley thus furnishes a safe criterion for determining whether a species of Peripatus is viviparous; and not only so, but he also gives authority for speaking of such a specimen as that to which he refers as a pregnant specimen. For he says that "of twenty female specimens dissected only one was found which did not contain embryos in some stage of development" (p. 766), and (on p. 767) "and in nearly all the pregnant specimens examined, &c.," and on p. 771 "the period of pregnancy" of two of them is spoken of, while the specimen not containing embryos is alluded to as "though, as before-mentioned, one still virgin female was found." Clearly, then, Moseley uses the term pregnant in the ordinary etymological sense of being "in the condition preparatory to bringing forth young," or, briefly, "with young." Additional authority for the use of the word in connection with Peripatus is,

if necessary, furnished by Sclater, who after speaking of the embryos contained in the uterus of the S. American species which he proposed to call *P. imthurni*, goes on to say of breeding females: "I am unable to say whether they are pregnant all the year round, but it seems probable that this is the case." *

And as Moseley's knowledge of the viviparous nature of *P. capensis* was thus entirely derived from the study of pregnant specimens, as he himself terms them, and as his observations on this point, the correctness of which has never been questioned, are simply a record of pregnant specimens, it is quite clear that in dealing with other species of Peripatus about whose mode of reproduction nothing was previously known, any observer who meets with a female containing embryos knows *ipso facto* that he has to do with a viviparous species, he is entitled to speak of such a specimen as pregnant and is correct in so doing, and a record of a pregnant specimen is a record of a viviparous species. And if instead of taking the embryos out of the uterus oneself, they should be extruded during the process of drowning the mothers—by which means, as Sedgwick has recommended, one can obtain uncontracted specimens—owing, as I suppose to the continued struggles, this obviously is only another phase of the same thing, and is quite as satisfactory evidence of viviparity.

I first met with living specimens of the N.S.W. Peripatus in June, 1888, and on the 27th of that month I exhibited three of them at a Meeting of this Society, a notice of the exhibit appearing in due course in the Proceedings [Vol. iii. (2), Part ii. p. 892—published September 10th]. The subsequent history of two of these specimens—the third made good her escape, and I lost all trace of her—is soon told. Dr. Haswell was desirous of examining the muscles of Peripatus in the fresh condition [*vide* his Note on the subject in Report of Austral. Assoc. Adv. of Sc. Vol. ii. p. 487] and I promised him one of my specimens, and within a fortnight after the meeting I sent it to him. A few days afterwards when I next saw him, he told me that he had utilised the specimen, and that she was pregnant, or contained embryos—I am not sure now which of the expressions was used; and he added further

* Studies from the Morphol. Lab., Cambridge, Vol. iv. p. 215.

that he had saved one of the embryos for me and would let me have it at the first chance. For some time no opportunity offered, and as it was not a matter of vital importance I did not worry him about it; but, as Dr. Haswell is known to be both a skilful and a veracious biologist, on the strength of his statement to me I was quite justified, even in the absence of an affidavit, in appending a footnote to the notice of my exhibit, as the proof finally left my hand, as follows: "One of these [three specimens exhibited] was subsequently dissected, and proved to be pregnant" (l.c. p. 892). This statement is brief, I admit, under the circumstances necessarily so; but no reasonable objection can be taken to it on other grounds. I have shown that the specimen was one that Moseley would without hesitation have called pregnant; and the inferences that he would have drawn under the circumstances are evident from the quotations already given from his paper. Also, as I have already remarked, Professor Haswell is still in Sydney.

The second specimen I kept, partly in the hope that she might live to produce young, and partly because I was much interested in her: as far as possible she was inspected daily, and from time to time the contents of the tin in which she was kept were carefully lifted out for an airing, and as carefully replaced. On October 24th I found her dead, and with her corpse four living newly born young ones; these I exhibited at a Meeting on the 31st, and I said of them that they were the progeny of one of the females exhibited in June preceding and that the mother had died a few days ago after giving birth to them [Proceedings l.c. p. 1508]; and in so saying not only did I know that another female got on the same day, at the same place, probably under the same stone, had been found by Dr. Haswell to be pregnant three months before, but when I made that statement I believe myself to be perfectly correct in saying that I actually had in my possession the embryo promised me by Dr. Haswell; that in fact he brought it to the Meeting, and handed it over to me there and then; it is mounted in balsam, and labelled in his own handwriting; and I have had it in my possession ever since. The part of the Proceedings containing the notice of the exhibit was published on

March 22nd, 1889, but a notice of it appeared in the Abstract two days after the Meeting.

Confirmatory evidence was soon forthcoming. In November of the same year I got two specimens of Peripatus at Burrawang; they were exhibited at a Meeting of this Society on November 28th, and they were drowned on December 14th; in the process one of them extruded five embryos considerably older than Dr. Haswell's specimen. On September 18th, 1890, a specimen from the Blue Mountains under similar circumstances extruded three advanced embryos; and in December of the same year from a second lot of specimens from Burrawang some twenty or more embryos were obtained. These were carefully preserved; and they were shown to Professor W. Baldwin Spencer, who happened to be passing through Sydney early in September last, a few days after I saw the first of Dr. Dendy's four papers; they were also exhibited at a Meeting of this Society on September 30th, and their bearing on the subject at issue pointed out.

The climax in my experience, however, was reached in quite an unexpected and rather overwhelming manner in January of this year, during a visit to the Blue Mountains, part of the time at Mt. Wilson, where, with the help of Mr. J. D. Cox and Mr. A. G. Hamilton, I got about forty specimens; the following week elsewhere I was able to increase the number, and I came back on the 16th with fully 100 living healthy specimens. When collecting, young ones were never once met with; but in getting two females out of rotten wood I accidentally gashed them in the side; in one case there immediately protruded a moniliform portion of one of the oviducts suggestive of the presence of embryos; the other one was evidently in distress and I kept her under observation, and finally a little later I saw her in the act of depositing four advanced embryos; these with the two females were promptly preserved. On Jan. 18th I put all the specimens into fresh and more comfortable quarters, keeping them in four separate lots, but there were still no young ones. On Jan. 25th I first noticed young ones, the number steadily increasing day by day, and until young ones were present in each of the four tins; frequently twenty or more could be seen at once when one of the tins was

opened; altogether there must have been at least 200 born, for after a number had died I counted 124 on Feb. 12th, and these just what I could see without routing out the cracks and crannies of the pieces of wood. A period of typical sweltering Sydney summer heat set in unfavourable alike to adults and young; the mortality began to increase, and a number of the adults began to develop white bladdery swellings about the head; and as I saw there was little use in trying to keep them much longer, I took steps to preserve the adults, and a sufficient number of the young, the others being liberated in the bush-house. Of a number of adults which were drowned, one extruded four embryos nearly at the full period, one extruded two, and three others extruded one each on February 11th; of the last lot five females were chosen at random and opened, and the oviducts and uteri displayed but not otherwise interfered with; in one case these contained neither ova nor embryos; in the other four they were simply crammed with embryos, the pigmented tentacles of the oldest showing plainly through the membranes and the uterine wall after being a little while in spirit. A representative selection of the above was exhibited at the Meeting of this Society in February last.

Such then are some very simple facts about the mode of reproduction of the New South Wales Peripatus which has never been called otherwise than *P. leuckartii*. As facts about a Peripatus which, like all extra-Australian species is viviparous, they are in no way remarkable except that they are entirely and irreconcilably out of harmony with Dr. Dendy's very widely circulated and positive statements about the oviparity, not of the Victorian Peripatus, but of the common 30-legged Australian Peripatus known hitherto as *P. leuckartii*, Säng. In view of these simple facts; in view also of the simple fact that of the first two small batches of Peripatus which I had a share in finding, one specimen was found on dissection to be pregnant, another brought forth her young in due course, and a third in the process of being drowned extruded five advanced embryos—all before Dr. Dendy had ever seen an Australian Peripatus; and also in view of the also equally simple fact that on July 31st, 1891—as well as up to and including December 31st of the same year—Dr. Dendy had never seen

a newly hatched specimen of an oviparous Australian Peripatus, nor did he know of a single instance in which young had ever hatched from eggs laid by such an animal—it certainly is very wonderful that on July 31st, 1891, Dr. Dendy should not only imagine himself to be, but in four different Journals should pose as, the sole repository of all human knowledge, the infallible source of all wisdom on the subject of the mode of reproduction of the common widely distributed Australian Peripatus with fifteen pairs of walking legs, known as *P. leuckartii*; especially as that knowledge and wisdom included such items as that—leaving the local Victorian *P. insignis* out of consideration, nothing having as yet been ascertained about its mode of reproduction—there is no viviparous Australian Peripatus, that the young of the oviparous *P. leuckartii* are hatched at the end of October from eggs laid in the preceding July, thus completing their development in something like three or four months. And while no objections need at present be raised against Dr. Dendy's claim on the score of the excessive modesty and the imposing masterfulness implied thereby, very solid objection to it can be raised on the ground that it does not represent quite accurately the present state of anybody's knowledge about any known Australian species of Peripatus whether in New South Wales, Queensland, or Victoria.

And as, on the subject of Peripatus, I followed so safe a guide as Moseley, and called a pregnant specimen one which on dissection proved to be pregnant; or spoke of the young of a viviparous animal as having been born, it is not evident what there is about such a proceeding savouring of imposture, or perversion of the truth, that one's statements should, without inquiry or investigation, be deemed unworthy of credence. If such statements appeared to Dr. Dendy to be incompatible with truth, it would have been a simple and a courteous matter to have sent me a note of inquiry as to what I really did mean: such at least would not have been the first communication with which in the past he has favoured me on the subject of Peripatus; it would have received due attention, and within twenty-four hours he would have learned that, however little might have been known about the mode of reproduction of the N.S.W. Peripatus before July 31st

1891, certainly the events of that day were not likely to advance our knowledge at all.

The field open to biologists in Australia is wide enough, and the number of workers is few enough, to allow of abundance of fruitful material still being available; and it is quite possible even at the present day to go on a voyage of discovery in Eastern Australia, or even to aspire to fill the rôle of a Biological Captain Cook. But under such circumstances it would not seem at all necessary to allow zeal to run away with discretion, or to discover too much, or to suppose any one grossly incapable in not finding the hypothetical eggs supposed to have been laid by a viviparous specimen of Peripatus, even though the opportunity of doing so suppositiously lasted over four months and the deposited eggs of *P. leuckartii* are "easily seen, being fairly large," or even "very large"; nor in exposing the crass ignorance of other people would it be advisable to forget that one's own statements should be free from grave errors; nor as a prognosticator would it be worth while to be so painfully accurate in fixing the date almost to a day on which the young of the oviparous *P. leuckartii* do not by any chance hatch, or the exact number of months, after the deposition of the eggs, in which the young of *P. leuckartii* cannot possibly complete their development.

And since Dr. Dendy has quite settled matters relating to the mode of reproduction of the Australian Peripatus on a firm basis, and has proved quite conclusively, to his own satisfaction at least, that *P. leuckartii*, the common Australian Peripatus with fifteen pairs of walking legs, is oviparous and differs widely in its mode of reproduction from all other known species, it now only remains for him to push his conclusions to a logical end by showing in what a far-reaching and revolutionary manner prevalent notions on the subject of the mode of reproduction of extra-Australian species of Peripatus are affected thereby. For inasmuch as the N.S.W. Peripatus is not *P. insignis* it must be *P. leuckartii*, which Dr. Dendy has shown to be oviparous; and it entirely agrees as to its mode of reproduction with *P. capensis*, with *P. balfouri*, with *P. novæ-zealandiæ*, with *P. demeraranus*, with *P. edwardsii*, and with *P. torquatus*, for instance, therefore, &c.