

The Searchlight Series

NO. 1

THE PROBLEM OF
**The Birth of the
Kangaroo**

By Professor T. THOMSON FLYNN, D.Sc.
Ralston Professor of Biology,
University of Tasmania.



ISSUED BY
THE WORKERS' EDUCATIONAL
ASSOCIATION OF TASMANIA
1928

FOREWORD



THE accompanying essay on the Birth of the Kangaroo is published by the W.E.A. at the suggestion of members of Professor Flynn's Class in Biology and Evolution. A lecture given to this class on the subject attracted wide attention, drawing exponents of the warring factions of the controversy from as far as the Huon to attend. After hearing the Professor's evidence and examining the specimens from the University Biological Museum all were convinced that his conclusions were beyond dispute, and it was believed that a good service would be rendered by the W.E.A. in making the matter of the lecture more widely available in pamphlet form.

This pamphlet is No. 1 of the Searchlight Series, which the Workers' Educational Association proposes to publish from time to time as the occasion arises, as a definite extension of its work in the field of Adult Education.

In the few years since its inception the W.E.A. has become a leading force and inspiration in the educational life of the community. Both in the cities and country towns of the State its members meet regularly in classes to study such subjects as Economics, Literature, History, Science and Art under the leadership of lecturers appointed by the University. By this means the teaching of the University is carried into the towns of the North, North-West and North-East, and to the country centres round Hobart.

The movement is indeed another and democratic revival of learning, compelling the attention of all thinking people, and it is hoped that all readers of this pamphlet will make themselves further acquainted with the work of the W.E.A.

The Problem of the Birth of the Kangaroo

FROM time to time, the question of the birth of the kangaroo comes to the fore. Many letters are written to the local press, argument waxes fiercely and opinions and counter-opinions are given and taken.

There is, of course, considerable justification for this, for, to the unscientific mind, there are puzzling features about the whole matter, which are difficult of explanation and serve at the outset to mark off the kangaroo as being very different from a cat or a dog, or any other such animal ordinarily met with.

Here is an animal in which the young one is very immature, hardly developed, and apparently incapable of any very active movements. How is it possible that such a mite, not much more than an inch long, to all intents and purposes helpless, becomes attached and remains attached in the pouch of its mother?

The answer of the bushman is simple and direct. It is born in the pouch where it remains!

That this is entirely wrong I will show in this article.

I am not going to confine my remarks to the kangaroo. There is a whole group of animals which are similar to the kangaroo in their method of development. These are the marsupials or pouched mammals. They are to be found now only in Australia and in America. They include such familiar animals as the kangaroos and kangaroo rats, opossums, native cat and tiger cat, bandicoots, wombat, Tasmania "wolf" (thylacine), Tasmanian "devil," the American opossum and others.

In all these there is a pouch. In all of them also, the young, when born, is small and apparently immature, and remains attached for some time in the pouch. In all of them, therefore, the same

problems arise and the same questions have to be answered.

In the biological laboratory of this University many of these animals, particularly the native cat, the ringtail opossum, the kangaroo and the kangaroo rats have been thoroughly investigated, and observations have also been recorded on others.

The Marsupial Egg

The very earliest stage of the development of any marsupial is an egg, and this has a particular form and a definite structure.

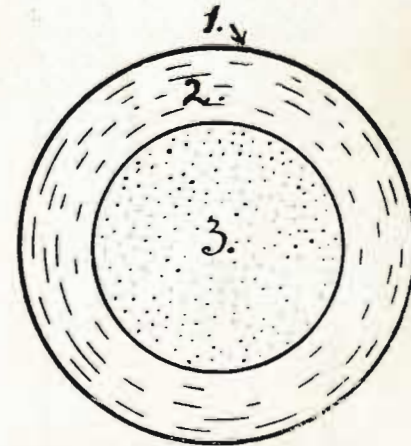


DIAGRAM OF THE STRUCTURE OF A
MARSUPIAL EGG

The figure 1 points to the shell; the figure 2 indicates the layer of albumen or white of egg, while at 3 is the central part consisting of yolk and protoplasm from which the young one is formed

The egg is always rounded or spherical and has a build which is almost like that of the egg of a fowl.

If you will call to mind the structure of an ordinary fowl's egg you will remember that, broadly speaking, it is as follows. On the outside there is a shell, then there is a layer of "white of egg" or albumen, then within all a rounded ball of yellow yolk.

On one side of this yellow yolk there is a small white patch. It is this patch which will afterwards develop into the chicken, the yellow

yolk and albumen being merely food for the young one until it is hatched.

The egg of the kangaroo or any other marsupial is built entirely on the same lines.

I have made a rough drawing which will indicate this. On the outside of the egg there is a thin shell. Then follows a layer of albumen, and then within all there is a round mass of yolk substance, which also contains the material (protoplasm) from which the young one will develop.

It will be seen that there is no essential difference between this egg and that of a bird or reptile. The main differences are those of size and the subsequent story.

In the matter of size the marsupial egg is extremely small. It cannot be found without the aid of a microscope. Here are some of the measurements: native cat, 1/75in., American opossum, 1/60in., ringtail opossum, 1/100in., Tasmanian devil, 1/60in., etc.

As regards the subsequent history of this egg it, of course, is not laid as is the case with the egg of a bird.

The development of the marsupial egg takes place within the mother.

The shell which covers it gradually becomes thinned out and disappears, while the albumen layer becomes used up. The innermost portion develops into the young one and growth goes on until birth takes place in the usual way.

Significance of Shell

The possession of a shell in this egg is perhaps of very little value, but its presence is sufficient to show that marsupials had, in the dim distant past, ancestors who laid eggs much as do birds nowadays, and it is only recently that these animals have acquired this type of development, part of which goes on in the mother.

The kangaroo, kangaroo rats and brush opossums generally only have one young at a birth, but in many of the others an extraordinary condition of affairs exists.

For example, our native cat, which can accommodate only six in the pouch, may give birth to

as many as thirty-five at once, and the American opossum, which usually has thirteen in its pouch, may have as many as twenty-two at a birth.



A LITTER OF NEWLY-BORN RING-TAIL OPOSSUMS

None of these young ones have been attached. Since the pouch of the Ring-tail Opossum holds only two, death by starvation awaits the other three

The accompanying photograph shows a litter of five newly-born young of the Tasmanian ring-tail opossum. These were obtained immediately after birth and had never been attached. Sometimes as many as six are born to this animal of which only two can become attached in the pouch.

It is a severe instance of the survival of the fittest. Those to become first attached receive food and develop normally; the others linger on for a little while, and then die by starvation.

Several times I have seen in the pouch of this animal the dried up remains of those pouch-young, which were unable to reach the source of the food supply.

A similar condition of affairs exists in the Tasmanian devil, from the female of which I have taken twenty-two eggs, although the largest number of young I have taken from the pouch is four.

Born in the Usual Way

The above facts represent, in some small degree, what is scientifically known of the early development of these animals. It will be seen that there is little room for doubt that the young marsupial does not grow in the pouch, but develops and is born in the usual way.

How does this young animal get into the pouch?

When the marsupial is born, as I have said, it measures about an inch long, and to those who have seen it a little later when attached it appears to be quite inert, almost incapable of movement, and no more than a piece of jelly-like material.

Under these circumstances it is difficult to conceive that such a tiny morsel of living flesh could make any very great endeavour for itself.

So the bushman and trapper come to the conclusion that it grows in the pouch. The American bushman holds a theory too, but it is entirely different to that of his Australian confrere.

There are only two methods by which the young one can get to the pouch; it must either be put there or arrive there of itself.

The only way of finding out what does happen is to actually see it.

The first observation of the kind was made over a century ago. Professor Barton, of Philadelphia (U.S.A.) published in 1806 his observations on the birth of the American opossum. A copy of this pamphlet is in the University of Tasmania.

In it Professor Barton says: "The young opossum, unformed and perfectly sightless as they are at this period, find their ways to the teats by the power of an invariable, a determinate instinct, which may, surely, be considered as one of the most wonderful that is furnished to us by the science of natural history. It is not true, as has been often asserted, that the mother, with her paws, puts the young ones into the pouch."

It was not until 1920, one hundred and fourteen years afterwards that any further observations were made on the American opossum. These were by Doctor Hartmann of the University of Texas. He kept a female opossum in a cage in a

window and put it under a guard night and day. Here are his remarks on the birth of this animal:

"A tiny bit of flesh appeared, and scampered up over the entanglement of hair into the pouch to join the other foetuses, which now could be seen to have made the trip without our having observed them.

"Examination of the pouch of the mother shewed that it contained a squirming mass of eighteen red embryos, of which twelve were attached, though thirteen might have been accommodated. The remainder were, of course, doomed to starvation. Even some of these unfortunates, however, held on with their mouths to a flap of skin or to the tip of a minute tail, while several continued to move about."

It was found that any of the young ones could readily find their way to the pouch, if taken out and placed on the mother's fur well below the pouch. They always crawled upwards. Their method of progress was by means of overarm strokes as in swimming.

Back to Australia

Now let us return to the consideration of our own Australian animals, notably the kangaroo.

In dealing with these I am only going to put on record actual observations which have been published. I am not going to pay any attention to opinions not backed up by actual observation.

Hope, of Queensland

The first actual record concerning the kangaroo is that of the Hon. L. Hope, published in the Transactions of the Philosophical Society of Queensland in 1882. He says:

"My observations have reference only to the mode of transference of the embryo to the pouch, which I now believe to be affected by the embryo itself; or, at any rate, with very little assistance from the mother, and that almost unconsciously given. I heard lately of an instance of the same appearances having been observed by a kangaroo hunter, and was pleased to find the confirmation of his story by my own experience.

"He had concluded that the young one had been born during the parent's dying agonies, and described almost exactly what I afterwards saw.

'that the embryo was working its way through the fur straight towards the orifice of the pouch.'

"The dam that I shot had been dead, perhaps, five minutes before I noticed what was going on, but I don't think sufficient time had elapsed for the young one to have made its way so far. It was then within five inches of the orifice of the pouch . . . closer inspection showed it to be working actively with its fore legs—arms, in fact—which were considerably developed, with the claws apparent. It was about one and one-third inches in length, the tail and hind legs undeveloped. . . . After watching it a few minutes, and not having much time to remain, I took it from the fur, to which it seemed to adhere pretty firmly, and placed it on the closed orifice of the pouch.

"It soon left this, however, and commenced travelling through the fur, which was pretty long, with considerable energy.

"As, however, it began to describe circles, and appeared, as I may say, rather to have lost its way, after a few minutes more I placed it again on the closed orifice of the pouch, taking care that the head sank among the folds of the skin I have mentioned. It then seemed to endeavour to burrow in. At this stage I had to leave it, as the day was advancing, and I had an engagement elsewhere."

He further remarks: "What struck me was the marvellous energy and apparent endurance of the embryo in its course, and the small chance there seemed to be of its falling from the fur, which, while producing adherence, did not seem to impede its progress materially."

On January 3rd, 1913, Mr. A. Goerling, of Western Australia, wrote an account of the birth of the kangaroo as he had seen it, for the "Western Mail," Perth. His account is as follows:

"On the morning of the abovementioned date (February 25, 1906), I was attracted by the peculiar behaviour of a female 'Macropus rufus.' She refused the feed placed before her, and I came to the conclusion that the animal had just given birth to a young one. She was sitting in that resting position in which kangaroos can often be seen, the tail passed forward. Thus she was sitting almost entirely on the thick part of her tail. She took no

notice of my presence although not more than three weeks in captivity.

"Presently she lifted her head, when I was astonished to see a young kangaroo clinging to the long fur about four inches below the opening of the pouch.

"It moved slowly, very slowly, through the fur upwards, using the arms in its progress, and continually moving the head from side to side, thus assisting the upward movement. Nearly thirty minutes were required by the little wanderer to reach the top of the pouch, the last ending in a semi-circle. During the whole of this time the mother paid no attention to her offspring, offering no assistance, and leaving it entirely to its own exertions."

On a previous occasion Mr. Goerling had noticed a baby wallaby clinging to the fur below the pouch of a female captive and had thought that the mother's restless movement had dislodged it.

The "Pastoral Review" (Melbourne), of July 16, 1923, prints a letter from Dr. W. T. Hornaday, Director of the New York Zoo, which gives a record of some observations taken of Australian kangaroos and wallabies in that zoo.

This letter is given herewith, with one or two slight immaterial elisions:

"We have a large and fine collection of kangaroos, and for the past three years in particular our kangaroo keeper has been keenly on the alert to discover how young kangaroos are born and how they are conveyed to the pouch. After long and patient watching, he was at last rewarded by witnessing the process under very favourable conditions.

"The demonstration was afforded by a kangaroo of large size, called Bennett's kangaroo. With considerable enthusiasm he related to me immediately after the occurrence the manner in which he saw it occur. Keeper Riley said that the kangaroo sat upon the floor of her cage. On the flat table of the tail the young kangaroo was born, emerging without difficulty in the usual fashion. He said that it was about as long as the terminal joint of his little finger.

"He declared that the little animal was physically perfect, and within a minute or so after it

appeared on the flattened tail of the kangaroo it began to scramble about as if looking for something, and the next instant it rather nimbly scrambled up the hair covering the abdomen of the mother, found the pouch, and quickly entered it.

"This closed the observation until some weeks later, when he saw the head of the little animal protrude from the pouch and take a view of the world.

"I do not undertake to say that all kangaroos are born in this fashion, nor do I venture to assert that kangaroo mothers never assist their young into the pouch. I have been told that some kangaroo mothers do by means of their front paws help their young to find the pouch and enter it, but on account of the tiny size of the newly-born young and the comparatively large size of a kangaroo's front paws it would seem to me rather difficult for the mother to be of much real assistance so far as her front paws are concerned.

"As a final contribution to this subject, I am now going to enclose a copy of the memorandum that we received on 30th March, 1921, from Mr. George F. Morse, jun., director of the Zoological Gardens in Franklin Park, Boston, Mass.

"It tells its own story, and it is thoroughly confirmatory of the observations of our own keeper. In this case, however, the tiny individual failed to find the pouch and the clumsy claws of the mother killed the frail creature, and so the birth operation was a failure. The following is a detailed report:

"At 2.19 p.m., the young one was born. It appeared to be perfectly formed, without hair, pink in colour, and an inch long. As soon as born it started to climb upward through the hair towards the pouch, with a slow wriggling and snakelike motion. It was evidently side-tracked by a groove in the abdominal hair, and its course was directed towards its mother's right hip. It took twenty-five minutes to climb to the same level as the pouch, and was then about two inches to the right of the pouch orifice, with a thick bunch of hair impeding its progress. Up to this time the mother was apparently oblivious of its presence, and made little movement. At 3.02 p.m. she started to get rather nervous, and kept looking for the young one and opening and lapping her pouch. At 3.07

p.m. she started to scratch with her right foot in the vicinity of the young one, and twice struck it with her claws. At 3.15 p.m. the young one dropped to the ground dead. Post mortem examination revealed severe concussions on neck and sides. Weight, $9\frac{1}{2}$ grains; length, nose to root of tail, $1\frac{1}{16}$ in.; hind legs, $\frac{1}{16}$ in., imperfectly formed.

"Needless to say, the testimony of Mr. Morse is to be relied upon as absolutely authentic."

Finally, Professor Lancelot Harrison, of Sydney, published the following communication in the "Sydney Morning Herald," of May 20, 1926:

"Through the courtesy of the Hon. Fred Flowers, M.L.C., chairman of the Taronga Park Trust, the following document has been placed in my hands for publication:—

"April 22, 1926—I hereby state that on the above date, about 10.30 a.m., having noticed the actions of a wallaby (female of the species *Macropus thetididis*) to be peculiar, I watched carefully and noticed her to be sitting with the tail brought forward under the legs. The animal was vigorously licking the fur between the base of the tail and the pouch. I was then able to see the foetus clinging to the fur near the tail.

"At this juncture, I summoned to witness H. McHugh, E. Harrison and F. Stone.

"The foetus moved slowly up through the fur with an automatic kind of movement of the fore limbs, but was unable to find the pouch and moved on higher and got lost near the chest.

"The female continued to lick the foetus, but made no attempt to render other aid, or remove it to the pouch. The female became restless, and in hopping away dislodged the foetus, which was recovered.

(Sgd.) J. S. Munro (keeper's asst.)

"We the undersigned did witness the movements as mentioned above, and swear that these statements are correct.

(Sgd.) L. McHugh (keeper)
E. Harrison (keeper's asst.)
F. Stone.

Claws That Help

If the reader will once again look at the photo of the newly-born opossums he will see that the fore limbs are much better developed than the hind limbs. These fore limbs have finely developed claws which are to help the animal to take hold on its way to the pouch.

In the case of the Native Cat we know that these claws are thrown off soon after arrival in the pouch.

I am not going to comment any further on the above information other than to say that all available well-authenticated evidence points to the fact that the kangaroo—and any other marsupial for the matter of that—bears its young in the usual way and, that the young one by its own unaided efforts, makes its way to the pouch.