



P H I L O S O P H I C A L
T R A N S A C T I O N S.

XXI. *An Experiment to determine the Effect of extirpating one Ovarium upon the Number of Young produced.* By John Hunter, Esq. F. R. S.

Read March 22, 1787.

IN all animals of distinct sex, the females, those of the bird kind excepted, have, I believe, two ovaria, and of course the oviducts are in pairs.

By distinct sex I mean when the parts destined to the purposes of generation are of two kinds, each kind appropriated to an individual of each species, distinguished by the

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appellation of male and female, and equally necessary to the propagation of the animal; the testicles, with their appendages, constituting the male; the ovaria, and their appendages, the female sex.

As the ovaria are the organs which, on the part of the female, furnish what is necessary towards the production of the third, or young animal; and as females appear to have a limited portion of the middle stage of life allotted for that purpose; it becomes a question, whether those organs are worn out by repeated acts of propagation; or whether there is not a natural and constitutional period to that power on their part, even if such power has never been exerted? If we consider this subject in every view, taking the human species as an example, we shall discover that circumstances, either local or constitutional, may be capable of extinguishing in the female the faculty of propagation. Thus we may observe when a woman begins to breed at an early period, as at fifteen, and has her children fast, that she seldom breeds longer than the age of thirty or thirty-five; therefore we may suppose, either that the parts are then worn out, or that the breeding constitution is over. If a woman begins later, as at twenty or twenty-five, she may continue to breed to the age of forty or more; and there are, now and then, instances of women, who, not having conceived before, have had children as late in life as at fifty years or upwards. After that, few women breed, even if they should not have bred before; therefore, there must be a natural period to the power of conception. A similar stop to propagation may likewise take place in many other classes of animals, probably in the female of every class, the period varying according to circumstances; but still we are not enabled

bled to determine, how far it depends on any particular property of the constitution, or of the ovarium alone.

As the female of most classes of animals has two ovaria, I imagined, that by removing one it might be possible to determine how far their actions were reciprocally influenced by each other, from the changes which by comparison might be observed to take place, either by the breeding period being shortened, or perhaps, in those animals whose nature it is to bring forth more than one at a time, by the number produced at each birth being diminished.

There are two views in which this subject may be considered. The first, that the ovarium, when properly employed, may be a body determined and unalterable respecting the number of young to be produced. In that case we can readily imagine, that, when one ovarium is removed, the other may produce its determined number in two different ways; one when the remaining ovarium, not influenced by the loss of the other, will produce its allotted number, and in the same time; the other, when it is affected by the loss, yet the constitution demands the same number of young each time of breeding, as if there were still two ovaria; consequently it furnishes double the number it would have been required to supply, had both been allowed to remain, but must cease from the performance of its function in half the time. The second view of the subject is by supposing, that there is not originally any fixed number which the ovarium must produce; but that the number is increased or diminished according to circumstances; that it is rather the constitution at large that determines the number; and that, if one ovarium is removed, the other will be called upon by the constitution to perform the operations of both; by which means the animal

should produce, with one ovarium, the same number of young as would have been produced if both had remained.

With an intention to ascertain those points, as far as I could, I was led to make the following experiment; and for that purpose chose pigs in preference to any other animal, because they are easily managed, and breed perfectly well under the confinement necessary for experiments. Having selected two female ones of the same colour and size, and likewise a boar pig, all of the same farrow; after having removed one ovarium only from one of the females, and cut a slit in one of its ears, that there might be no mistake between it and the other, I had them well fed and kept warm, that there might be no impediment to their breeding; and whenever they farrowed, their pigs were taken away exactly at the same age.

About the beginning of the year 1779, they both took the boar; but the one which had been spayed earlier than the perfect female. The distance of time, however, was not great, and they continued breeding at nearly the same times. The spayed animal continued to breed till September 1783, when she was six years old, which was a space of more than four years. In that time she had eight farrows; but did not take the boar afterwards, and had in all seventy-six pigs. The perfect one continued breeding till December 1785, when she was about eight years old, a period of almost six years, in which time she had thirteen farrows, and had in all one hundred and sixty-two pigs; after this time she did not breed: I kept her till November 1786.

I have here annexed a table of the different times of each farrow, with the number of pigs produced.

Spayed Sow.

Farrows.	Number of young.	Time.
1	6	Dec. 1779
2	8	July 1780
3	6	Jan. 1781
4	10	Aug. 1781
5	10	Mar. 1782
6	9	Sept. 1782
7	14	May 1783
8	13	Sept. 1783
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November following she was put to the boar, but brought no pigs. April 1784, she was again put to the boar, without effect, and never was observed to take the boar afterwards, although often with him. November 1784, she was killed.

Perfect Sow.

Farrows.	Number of young.	Time.
1	9	
2	6	
3	8	
4	13	Dec. 1781
5	10	June 1782
6	16	Dec. 1782
7	13	June 1783
8	12	Oct. 1783
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Eleven pigs more than were produced by the spayed sow in her eight farrows.

Farrows.

Farrows.	Number of young.	Time.
9	12	Feb. 1784
10	16	June 1784
11	12	Dec. 1784
12	16	May 1785
13	19	Dec. 1785

75

After which she bred no more.

The first eight farrows were	-	-	-	87
The last five farrows were	-	-	-	75
Total	-	-	-	162
The number from the spayed one	-	-	-	76
More than farrowed by the imperfect animal	-	-	-	86

It is observable, that both sows rather increased in their number each time the older they grew, although not uniformly; the difference between the first and last in both animals being considerable.

From the above table we find, that the sow with only one ovarium bred till she was six years old, from the latter end of 1779 till September 1783, about four years, and in that time brought forth seventy-six pigs. The perfect animal bred till she was eight years of age. In the last, if conception depended on the ovaria, it was to be expected, that she would bring forth double the number at each birth; or, if she did not, that she would continue breeding for double the time. We indeed find her producing ten more than double the number of the imperfect animal, and continuing to breed much longer.

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From a circumstance mentioned in the course of this experiment it appears, that the desire for the male continues after the power of breeding is exhausted in the female; and therefore does not altogether depend on the powers of the ovaria to propagate, although we must at the same time allow, that it may be influenced by the existence of such parts.

If these observations should be considered as depending on a single experiment, from which alone it is not justifiable to draw conclusions, I have only to add, that the difference in the number of pigs produced by each was greater than can be justly imputed to accident, and is a circumstance certainly in favour of the universality of the principle I wished to ascertain*.

From this experiment it seems most probable, that the ovaria are from the beginning destined to produce a fixed number, beyond which they cannot go, although circumstances may tend to diminish that number; that the constitution at large has no power of giving to one ovarium the power of propagating equal to two; for, in the present experiment, the animal with one ovarium produced ten pigs less than half the number brought forth by the pig with both ovaria. But that the constitution has so far a power of influencing one ovarium, as to make it produce its number in a less time than would probably have been the case if both ovaria had been preserved, is evident from the above recited experiment.

* It may be thought by some, that I should have repeated this experiment; but an annual expence of twenty pounds for ten years, and the necessary attention to make the experiment complete, will be a sufficient reason for my not having done it.

