tically obtained from this experience,—that in almost every case compression is at first not only justifiable but imperative, on the part of the surgeon, provided compression can be secured by appropriate appliances, and its effects watched with daily care.

There is one wholesome piece of writing which we cannot refrain from quoting before concluding our remarks. After having spoken of the advantages of compression over those of the ligature, M. Broca says :

“There is one circumstance which will appear in favour of the ligature, if science could countenance the selfishness and indifference of the surgeon; the application of the ligature is an operation brilliant, rapid, and apt to excite admiration in the looker on. When the vessel is properly tied, the surgeon has nearly completed his task; his mind is easy; he is not answerable for what may occur at a later period; whether his patient dies or recovers, his responsibility is protected. How much more delicate is the position of the surgeon who has recourse to indirect compression. Here, there is not much glory to be acquired; instead of an operation somewhat theatrical and made once for all, the measures are simple, slow, assiduous, and discouraging from the minuteness of their details. A thousand incidents may occur, and the obstacles which result from them demand incessant attention, a thorough fitness, and a perfect knowledge of all the features of the subject.” (p. 876.)

And here we must conclude. In taking leave of M. Broca, we have to thank him most sincerely for the pleasure and for the information we have derived from the perusal of his volume. The industry, the talent, and the care exercised in its preparation we cannot speak of too highly; and we feel satisfied that it will long prove one of the most useful and necessary works of reference that can be studied by students and teachers in the science of surgery.

ART. X.

On a True Parthenogenesis in Moths and Bees: a Contribution to the History of Reproduction in Animals. By CARL THEODOR ERNST VON SIEBOLD, Professor of Zoology and Comparative Anatomy in the University of Munich, &c. &c. Translated by WILLIAM S. DALLAS, F.L.S., &c.—London, 1857. 8vo, pp. 110.

MOST of our readers are probably aware that there is a remarkable alternation of processes in the generation of many of the lower animals, characterized by the interposition, between two cycles of ordinary parental generation, of one or more cycles of non-parental multiplication. In the latter, reproduction is effected (not only independently of a male and a female animal, but even independently of the ovaries or testes, which sometimes represent the sexes in one individual) by the development of embryos within the body of an imperfect creature, devoid of true generative organs, and bearing to its embryonic contents the relation of a nursing individual, a germ-stock, or a pupa-sac.

It is to a reproduction of this kind that Owen some years ago pro-

posed to apply the term *Parthenogenesis*. Limiting our attention to the fact, that it is a *lucina sine concubitu*, we may perhaps regard this term as applicable, though savouring rather of that peculiar variety of Greek adopted by advertising shirt-makers. But its inaccuracy in other respects is obvious. On the logical principle of *exceptio probat regulam*, by expressing the absence, it implies the possibility of sexual intercourse or impurity. Hence an animal which is neither a male nor a female, but a sexless neuter, cannot be termed a virgin in the true sense of this word. And any process of generation in which—whether by a fission of the original germ-mass or otherwise—the instrumentality of the sexes is dispensed with, is but very partially and inaccurately defined by the word *parthenogenesis*—a word which, foreign and uncouth as it is, ought at least to have the merit of really connoting its meaning.

The phenomena established by Von Siebold are, however, so much more strictly entitled to this name, that we may fairly expect it will henceforth be confined to them. Indeed, Owen appears almost to anticipate and acquiesce in such a transfer of its use; even while questioning the alleged inaccuracy of his own previous application of it. The constructor of that beautiful and philosophic system of knowledge summed up by the theory of the Archetype skeleton, can well spare such a trifling appropriation as that of a single inaccurate name.

The chief instances of true *parthenogenesis* detailed in the book before us are found in—1st, certain species of sac-bearing Lepidoptera; 2nd, in the ordinary silkworm-moth; and 3rd, in the honey-bee.

In all three cases, the proof of the process of course involves the disproof of ordinary sexual generation. And Von Siebold, while exposing the fallacies of some older statements of this kind, adds some curious information respecting the extraordinary acuteness of instinct by which the two sexes of some insects can discover each other under what would seem very unlikely circumstances. How, for instance, a number of (hitherto unnoticed) males of some insect become aware of the presence of a female, within a chamber from which they are shut out by doors and windows, is a mystery that almost drives one to certain Pythagorean theories of the grey old time to explain.

The process of parthenogenesis seems, in some of the Lepidoptera, to produce female individuals only. In the silkworm moth, in which it appears to be more exceptional, it produces both sexes, in what proportions to each other, remains at present unknown. In this insect, however, a large number of the eggs laid by the virgin female shrivel up, and remain barren.

It is from the honey-bee that our author brings forward the most striking example of the process, and the most accurate history of its details. Aided by the observations of Dzierzon, as well as by the facilities which this celebrated apiarian placed at his disposal, he has arrived at a series of conclusions which open a new chapter on the physiology of generation to the scientific world.

The ludicrous contradictions and fables of some of the older bee-

keepers are well known. The microscope, and the anatomical exactness which it permits, have, however, settled the leading points in the composition and polity of these wonderful communities. And the advocates of the "rights of women" must surely be delighted to find that what one of the oldest treatises* on the subject calls "the feminine monarchie," not only really deserves this name,† but exemplifies a form of divorce, the simplicity and finality of which even the most strong-minded woman would scarcely wish to see exceeded.

As regards the impregnation of the queen-bee, this would appear to take place, once for all, during her single flight from the hive in youth—the wedding flight, as it is termed. The noise made by the wings of the young queen attracts the attention of some one of the vagrant bachelors who hover in mid-air above the hive, and give out a sound which reciprocally informs the queen of their presence. The copulation takes place during this flight, and the queen-bee returns to the hive not only with her spermatheca filled with the semen destined to impregnate all the progeny of her five or six years of life, but with more or less of the male organs of her consort broken off in her body.

The most singular fact, however, remains to be told. All those eggs which are destined to become workers (imperfect females), or queens (perfect females), undergo an impregnation in what seems to be the ordinary way, by means of spermatozoids, which, as each egg passes the spermatheca in its course towards the external outlet or vagina, enter the ovum at a micropyle, and remain for some time visible in its interior; while, on the contrary, all those eggs which are destined to become drones, are extended without any such contact with seminal fluid, or penetration by the spermatozoids.

The presence and absence of spermatozoids are determined by the author from serial observations with the microscope. The destiny or character of the impregnated and non-impregnated eggs can be affirmed from their size and other appearances at the time, as well as from their subsequent development.

A variety of collateral facts are brought forward by Von Siebold, all of which illustrate and confirm the above more direct evidence of this extraordinary conclusion. The queen-bee that is crippled in her wings from birth, is thus rendered unable to take her wedding flight, and hence ruins her subjects by producing nothing but drones. In like manner, during her after-life, she may be pinched or frozen into a similarly one-sided (or rather unisexual) barrenness; these local injuries of the generative organs appearing sometimes to destroy the

* Butler, 1634.

† So that the noble lines of Milton!—

"Swarming, next appeared
The female bee, that feeds her husband drone
Deliciously, and builds her waxen cells
With honey stored"—

remain unscathed by the fierce criticism of Dr. Bentley, who dogmatically corrects the supposed ignorance of Milton by asserting that "The drone is not the bee's husband; and that the bees are all females seems an idle and idiotical notion, against the course and rule of nature."

1 *Paradise Lost*, Book vii. verse 489 *et seq.*

local conditions of impregnation, and hence thereafter to limit the act of generation to a reproduction of males. As the age of the queen advances, again her spermatheca becomes exhausted of its contents, and the number of eggs which receive spermatozooids undergoes a corresponding decrease, to end in an equally exclusive reproduction of drones. Lastly, the queen seems to have the power of producing either males or females at will; and this power, exercised as it is by the instinct of the whole community, appears to be specially evoked by the size of the cells into which the queen thrusts her body in the act of oviposition, so that the different size and shape of these cavities seems to be the stimulus or exciting cause of the impregnation or non-impregnation of the ovum. In this way the act of seminal impregnation is probably a strictly reflex one, called up by the mechanical excitement of the impaction of the queen's abdomen into a narrow cell.

The rarer instances in which a worker-bee produces drone-eggs are explained as probably due to worker-eggs having by some mistake received the royal food which is known to determine the perfect development of the female bee. And as the worker never copulates, the invariable production of drone-eggs, under these exceptional circumstances, is referrible to the same law as the casual or permanent production of such eggs by the more perfect female, or queen bee.

This brief outline of Von Siebold's chief results is all that our space permits us. It is quite enough, however, to suggest various reflections which we shall leave our readers to make for themselves. With facts in such startling contrast to almost all that is hitherto known respecting the generative process, there is little need to recommend caution in implicitly accepting them. The less, indeed, that the balance of probability generally inclines in the opposite direction; rendering us more disposed to forget our own ignorance, and to challenge all new accessions of knowledge a little too strictly, when they unsettle our previous ideas, however vague and meagre these may be. But, even assuming the complete accuracy of these observations, it is impossible at present to foreshadow their relation to the generative process in the higher vertebrata. They appear to indicate a law of which, in these animals, there is no representative; a type of reproduction which can scarcely be linked with the really bisexual character of the mammalian foetus, and which not even the teratology of the human or brute embryo seems likely in any way to explain.

The translator's work has been well executed by Mr. Dallas, and reproduces the original, evidently with faithfulness, and with all the smoothness which is really necessary to make it intelligible to the English reader. The judgment which led him to select this little monograph for translation is sufficiently shown by the value of the facts it discloses, facts which we shall be glad if this very scanty notice induces any of our readers to investigate for themselves.