

They have their saws, files, augurs, gimlets, knives, lancets, scissors, and forceps, with many other similar implements; several of which act in more than one capacity, and with a complex and alternate motion to which we have not attained in the use of our tools. Nor is the fact so extraordinary as it may seem at first, since "He who is wise in heart and wonderful in working," is the inventor and fabricator of the apparatus of insects, which may be considered as a set of miniature patterns drawn for our use by the Divine hand.

One of the most curious things connected with insect life is that succession of changes from the egg to the perfect state through which most insects pass.—How surprising it would be were a naturalist to announce to the world the discovery of an animal, which, for the first five years of its life, existed in the form of a serpent; which then, penetrating into the earth and wearing a shroud of pure silk of the finest texture, contracted itself within this covering into a body without external mouth or limbs, and resembling, more than anything else, an Egyptian mummy; and which, lastly, after remaining in this state, without food and without motion for three years longer, should, at the end of that period, burst its silken cœment, struggle through its earthly covering, and start into day a winged bird. And yet something analogous to this is continually going on.—With various modifications of minor import, it is the course through which all insects pass.

There are four stages of insect life—the egg, *ovum*, which is motionless and apparently lifeless; the grub, *larva*, which is active, but without wings, is voracious, and grows rapidly; the chrysalis, *pupa*, which is quite motionless, and does not occur in all insects; the perfect insect, *imago*, which is active, has wings, does not grow, and which, by laying eggs, perpetuates its kind.

The butterfly, with its gorgeous hues, its devious flight, and the comparative obscurity of its former life, has furnished to poets of all ages some of their most glowing similes, and to philosophers; from a very early date, a number of striking and beautiful analogies with the repose of the tomb, and the probability of a more glorious hereafter. How closely associated they are with the most agreeable images of the happy days of childhood when, like the youthful Marcius, portray-

ed by Shakspeare, we pursued the "rain-bow butterflies."

Witnessing, as the ancients did, the extraordinary changes of insect life without being able to account for them, it is quite possible that some of the wonderful tales of the olden time were grafted on the changes which they observed taking place in insects. The story of the Phoenix for example, in many of its particulars, closely resembles minor occurrences in the metamorphosis of insects. At first a worm, emerging from the ashes of its parent's funeral pile, and eventually a glorious winged creature, providing in the means of its own destruction the nidus of its future and unseen progeny. The fabled Phoenix might assuredly have acquired its type from the actual butterfly, without any violent stretch of the imagination. Then again, the ancient doctrine of metempsychosis or transmigration of souls would, to the minds of the early observers, be shadowed forth in the apparent restoration to life of the seemingly dead chrysalis. But the doctrine of a future state more glorious than that of transmigration also derived support and countenance from the same remarkable vicissitudes of insect life. What can be more wonderful than the fact that an unsightly worm should pass through a shrouded and death-like sleep, and should wake at last a splendid butterfly, to bask in the sunshine, float on impalpable atmosphere and quaff the luscious nectar of beautiful flowers. Well might those philosophers, on whose mind there dawned, albeit dimly, the great truth of an after life—well might they imagine their toilsome existence typified in the caterpillar, their descent to the quiet grave in the tomb-like repose of the chrysalis and the hereafter they signed for in the spirit-like resurrection of the happy butterfly; and seizing the idea, well might they designate these aerial creatures by the same word Psyche as that which signified soul.

If we enquire more minutely into the nature of the change, we shall perhaps be still more surprised at what we learn.

We find that a caterpillar is not in fact, a simple, but a compound animal, containing within it the germ of the future butterfly, enclosed in what will be the case of the pupa, which is itself included in the three or more skins, one over the other, that will successively cover the larva. As this increases in size, these parts expand, present themselves, and are in turn thrown off, until at

length the perfect insect, which had been concealed in this succession of masks, is displayed in its genuine form. That this is the proper explanation of the phenomenon, has been satisfactorily proved by Swammerdam, and other insect anatomists. This illustrious naturalist discovered, by accurate dissections, not only the skins of the larva and of the pupa incased in each other, but within them the very butterfly itself, with its organs indeed in an almost fluid state, but still perfect in all its parts. Of this fact you may convince yourselves without Swammerdam's skill, by placing in spirits of wine a caterpillar about to assume the pupa state, and letting it remain there a few days, for the purpose of giving consistency to its parts; or by boiling it in water for a few minutes; careful dissection will then enable you to detect the future butterfly. You will find that the wings, rolled up in a sort of cord, are lodged between the first and second segment of the caterpillar; that the antennæ, or feelers, and the trunk are coiled up in front of the head; and that the legs, however different their form, are actually sheathed in the caterpillar's legs.

Malpighi discovered the eggs of the future moth in the chrysalis of the silk worm only a few days old; and Reaumur those of another moth seven or eight days before its change into the pupa.

A caterpillar, then, may be regarded as a sort of locomotive egg, having for its embryo the included butterfly, which after a certain period assimilates to itself the animal substance by which it is surrounded; and its organs gradually develop and at length break through the shell which encloses it.

What a proof of Almighty and benevolent design there is in all the wonderful process. How hardened must be the heart which, in full view of these manifest proofs of divinity can say to itself, "No God." Is it not surprising that a larva, at first not thicker than a thread, includes its own triple or sometimes, eight fold skin, the case of a chrysalis, and a moth or butterfly, all curiously folded into each other; with an apparatus of vessels for breathing and digesting, of nerves for sensation, and of muscles for moving; and that those various forms of existence will undergo their successive changes by aid of a few leaves received into the stomach.

To be Continued