

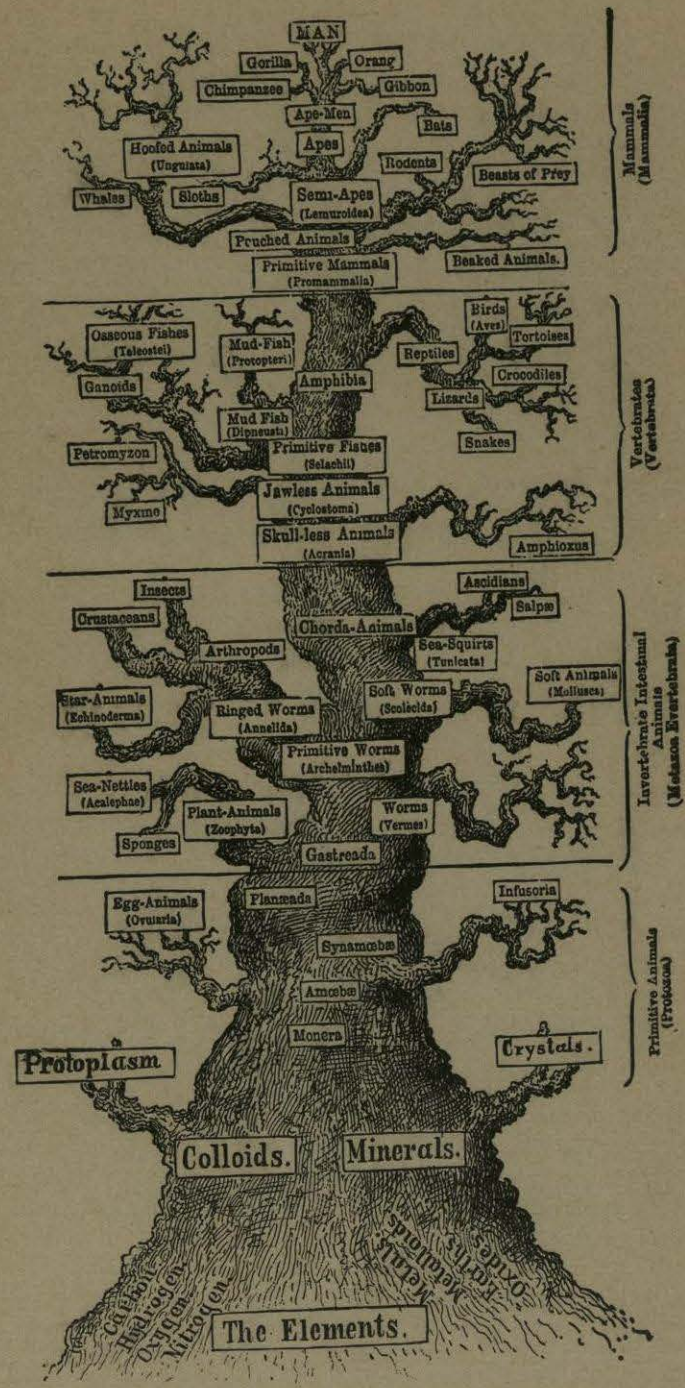
...and even from itself. Many a patient who might have passed safely through the ordinary course of a febrile operation has died from the toxic effects of the chlorophyl. In some cases the patient has died from the toxic effects of the chlorophyl, and in some cases the patient has died from the toxic effects of the chlorophyl. In some cases the patient has died from the toxic effects of the chlorophyl, and in some cases the patient has died from the toxic effects of the chlorophyl.

In regard to the two acids not chiefly used, ether and chloroform, there is no difference in their mode of action, but the chloroform appears to be more speedily absorbed, and its effects are more rapid. In some cases the patient has died from the toxic effects of the chloroform, and in some cases the patient has died from the toxic effects of the chloroform. In some cases the patient has died from the toxic effects of the chloroform, and in some cases the patient has died from the toxic effects of the chloroform.

ADDENDUM.

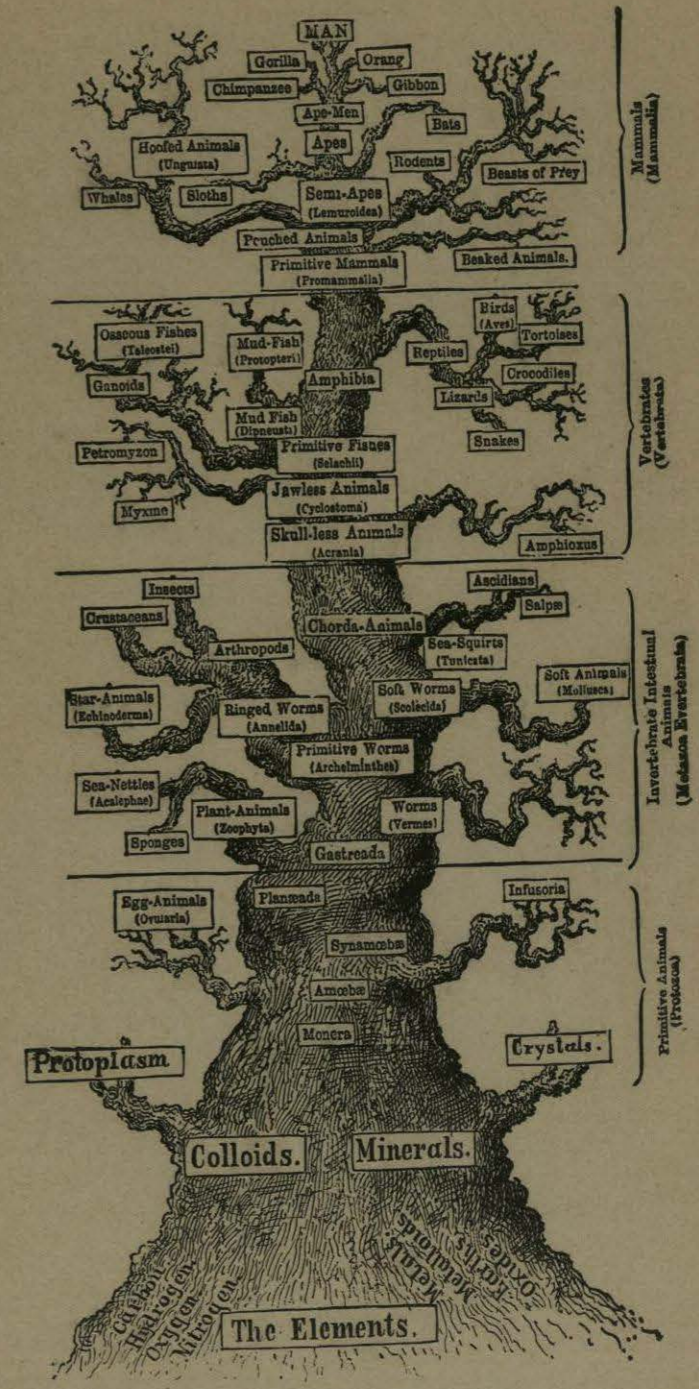
ILLUSTRATIONS OF EVOLUTION; AND THE PEDIGREE OF MAN.

APPENDIX
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The Evolution of Life and Pedigree of Man.

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CHAPTER LXXXIII.

EVOLUTION AND THE PEDIGREE OF MAN.

To still further elucidate the process of *Evolution*, and the *Descent of Man*, the following plates from Haeckel's "*Evolution of Man*" are appended to this edition of "*The Origin of Life*."

Professor Haeckel gives us a *Pedigree Tree*, showing the steps by which man has been evolved, along with other beings, from the lowest known living forms, the *monera*. This tree I have extended downwards, so as to start at the beginning. (See Plate XLI. Frontispiece.)

Commencing at the *root* of the tree we have the primary *elements*, which begin to arrange themselves together in groups of two or more, forming compound bodies differing from each other according to their composition.

On the left side we have those elements combining which form *mineral* matters, oxides, salts, and stones. The highest form of organization these compounds attain to is that of *crystals*. This is their extreme development, their highest type, and nothing further is to be expected from them. We have in them the perfection of *geometrical form*. They nearly all have straight sides, and regular angles; are homogeneous, and very little liable to change.

Passing to the right side we have certain of the elements, mainly carbon, hydrogen, oxygen, and nitrogen, forming into compounds commonly termed organic; such as ammonia, water, and carbonic oxide. These form into what are called *colloid* substances, such as gum, albumen, or white of egg, and jelly, which have no regular forms like mineral crystals, nor are they permanent, but constantly liable to change from slight causes.

One form of colloid matter is *protoplasm*, or the matter of life. It is a somewhat variable compound of carbon, nitrogen, hydrogen, and oxygen, and resembles the substance familiarly called jelly. From this substance, as explained in the earlier chapters of "*The Origin of Life*," all organic beings are evolved.

Referring to the *Tree* we find the *monera* the first and simplest of all living things, mere masses of jelly-like protoplasm, showing life only by simple motion as they are acted upon by surrounding influences.

Next, following the trunk of the tree, come the *Amæba*, a little higher, showing faint indications of *will* or *choice* in their movements; and these branch off into the *Infusoria* on one side, and into the egg-animals on the other. Ascending the trunk the development goes on till we come to the *Gastrea*, or animals with true stomachs; these branch off into *Sponges*, *Star Fishes*, *Mollusca*, *Zoophytes* (or plant animals), and various other forms till we reach *Insects* on one side, and *Ascidians* on the other. Some of the branches are subdivided into still smaller ones, but all can be traced back to the primitive form in the trunk from which they have all been derived. This primitive form—say one of the worms—may die out completely, while

the whole or part of the branches derived from it may remain. Or, on the contrary, all the branches may disappear, and the primitive worm still remain. It is not, therefore, a transformation of the primitive form *as a whole* into any of the branches that takes place, but some individual member of the primitive family, placed under modifying circumstances, begins to change, and the change goes on till the branch or variety results. The new characters which the branch acquires are communicated to its offspring by heredity, and are thus perpetuated. There is, however, always the primitive form underneath, and very frequently it is returned to, even in the remotest branches.

These beings, so far, are all *Invertebrates*, or without backbones; but the highest of them, the *Chorda Animals*, show faint traces of a nervous chord in the position where the backbone should be.

In the next group above we reach the *Vertebrate* animals, or those with backbones. The lowest of these, however, are skulless, and the backbone itself in some (as the *Amphioxus*) is little more than a firm jelly. A little higher up, however, we come to *Fishes*, and finally to *Amphibious Animals*. From these branch out a variety of new forms, such as *Reptiles*, from which come *Birds*. The fishes themselves branch off into a great many varieties, differing both in form and habits.

The highest group brings us to the *Mammals*, or those which suckle their young, to which group belongs man.

Following the main trunk, we have first the *Primitive Mammals*, or those showing the first imperfect rudiments of mammalian structure. To these succeed the *Pouched Animals*, then the *Semi-Apes*, the *True Apes*, *Ape Men*, and finally MAN himself.

At various stages, however, in this group as in all the others, branches diverge from the primitive stem, and assume a variety of forms, all, however, being mammals. Thus we have on one side *Beasts of Prey*, *Rodents*, *Bats*, and *Beaked Animals*, and on the other *Hoofed Animals*, *Whales*, and *Sloths*.

The Apes also have branched off into *Orangs*, *Gibbons*, *Chimpanzees*, and *Gorillas*; and finally man himself has diverged into several varieties, more or less different, and with distinctive characters more or less permanent.

It is erroneous, therefore, to suppose that man passed through all the forms represented by the *branches* of the tree. He has not sprung from a gorilla or chimpanzee, but these have branched off from that primitive *ape man*, from which all alike have sprung. In his embryonic development man shows this, for he passes through all the types below him, as shown on the *trunk* of the tree, till in his very beginning he is a mere mass of protoplasm.

Man never was an ape, nor have evolutionists ever said he was, in the sense that some people suppose. But unquestionably some individual of the primitive Ape-Man family was so far modified by his surroundings, as to become a true man, and from him the race has descended.

He must be traced downwards, therefore, through the different *types*, as shown in the *trunk* of the tree. In the same way every branch can be traced back to its original type in the main trunk, and thence downwards to the primitive elements.

Whether still further development may take place, and a still higher being than man be evolved, we know not, but it is quite possible that the *tree* may finally have to be carried still higher.

The correspondence in structure of man and the animals nearest to him now

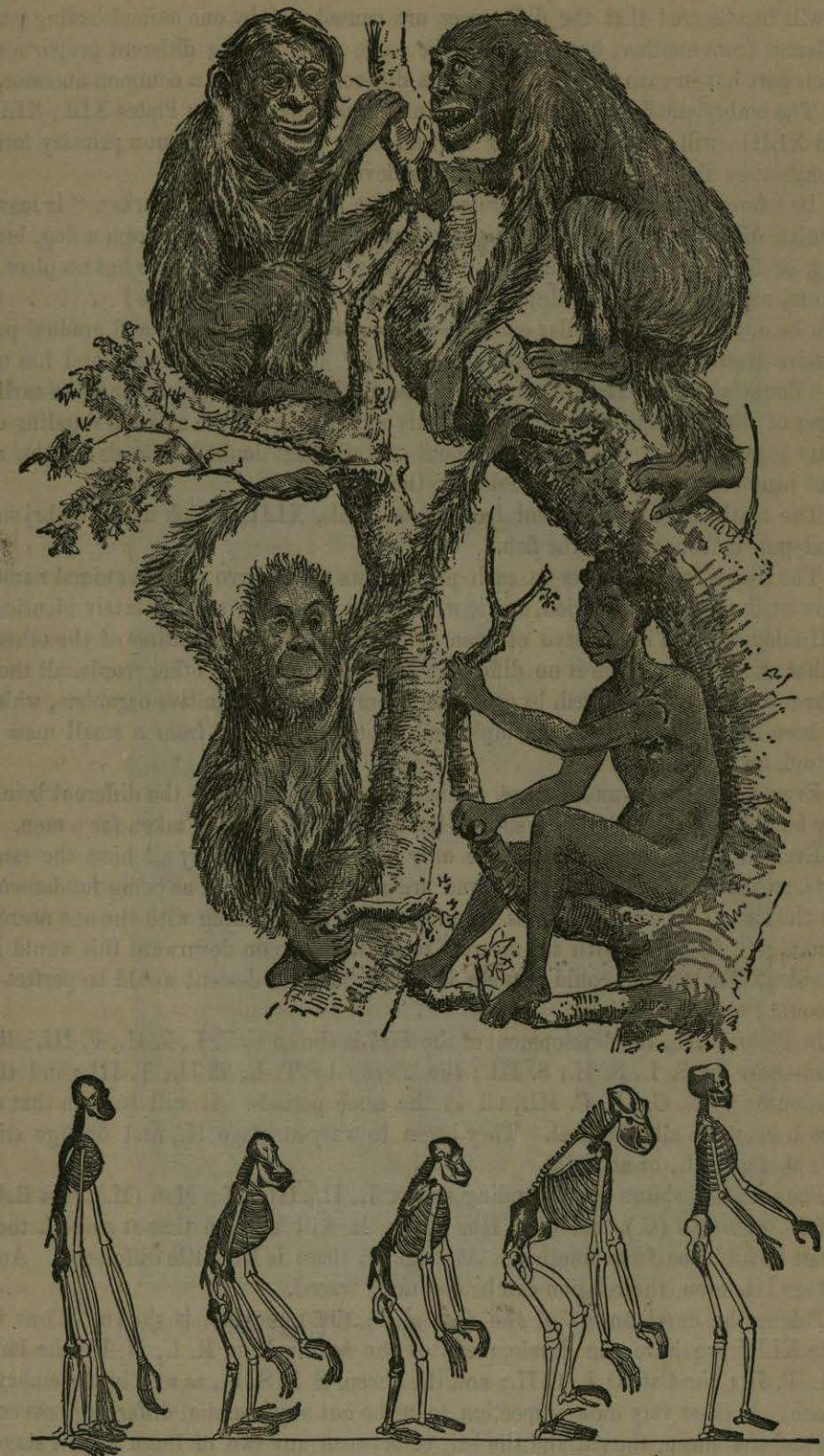


FIGURE 197.—Correspondence of Structure in Man and Apes.

known is well shown in Figure 197, both in external form and bony structure.

It will be observed that the differences are caused not by one animal having parts different from another, but simply in the same parts having different proportions. Each part has in each been modified, in a different way, from a common ancestor.

The embryonic development of different animals, as shown in Plates XXI., XLII., and XLIII., will make it clear how they all start from one common primary form, though they diverge so much in their after development.

In reference to the point illustrated by these plates Huxley remarks: "Is man a peculiar organism? Does he originate in a wholly different way from a dog, bird, frog, or fish, and does he thereby justify those who assert that he has no place in nature, and no real relationship with the lower world of animal life? . . . Or does he develop from a similar embryo, and undergo the same slow and gradual progressive modifications? The answer is not for an instant doubtful, and has not been doubtful for the last thirty years. The mode of man's origin, and the earlier stages of his development, are undoubtedly identical with the animals standing directly below him in the scale. Without the slightest doubt he stands in this respect nearer the ape than the ape does to the dog."

The truth of this is evident from Plates XXI., XLII., which depict embryonic development from man to the fish.

The upper row of figures in each plate shows the embryo of each animal named below at the same early period, and it will be seen that they are absolutely identical, as Huxley says. The embryo of man is exactly like that of either of the others, so that at this stage there is no difference between them. In other words, all these different animals are derived, by evolution, from the same primitive organism, which has been itself evolved from a simple cell, or egg, and that from a small mass of protoplasm.

Even at a more advanced stage, as shown in the middle row, the different beings vary but little from each other, so that the hog could readily be taken for a man.

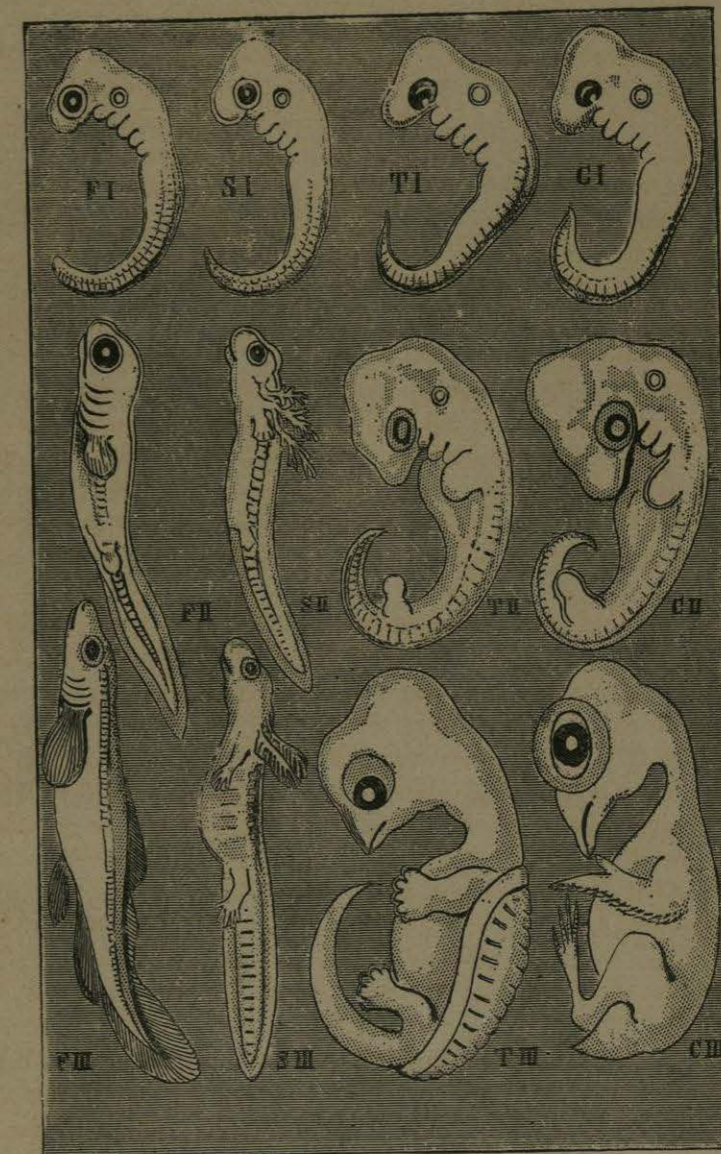
Even at birth the deviations are only modifications. They all have the same parts, as shown in the bottom row, and are readily recognized as being fundamentally the same. If a perfect series were to be shown, beginning with the one nearest to man, and following with the nearest to that, and so on downward this would be so evident that no one could dispute it. The chain of descent would be perfect if we could show all the links.

In Plate XLII., the development of the *Fish* is shown by F. I., F. II., F. III.; the *Salamander* by S. I., S. II., S. III.; the *Turtle* by T. I., T. II., T. III.; and the *Chicken* by C. I., C. II., C. III., all at the same periods. It will be seen that at stage I. they are all identical. They begin to vary at stage II., and diverge still more at stage III., or at birth.

Plate XLIII. shows corresponding stages, I., II., III., of a Man (M.), of a Rabbit (R.), of a Calf (C.), and of a Hog (H.). It will be seen that at stage I. they cannot be told one from another. At stage II. there is but little difference. And at stage III. even, the relation can be distinctly traced.

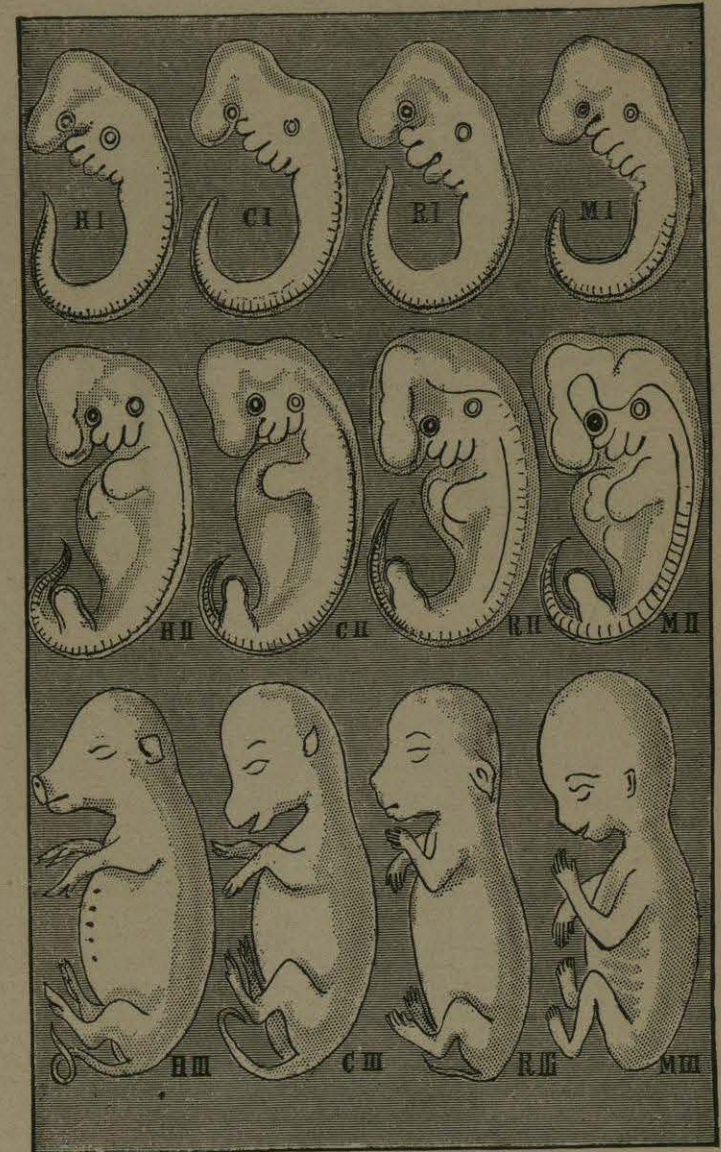
Taking the development of the *face* alone, the same fact is shown. Thus in Plate XLIV. we have the development of the face in Man, M. I., M. II.; the Bat, B. I., B. II.; the Cat, C. I., C. II.; and the Sheep, S. I., S. II., as seen in the embryo of each. It takes very close inspection to make out any essential difference between man and the sheep, the cat and the bat, or between any two of them at this stage, notwithstanding the great dissimilarity between them in after life.

PLATE XLII.



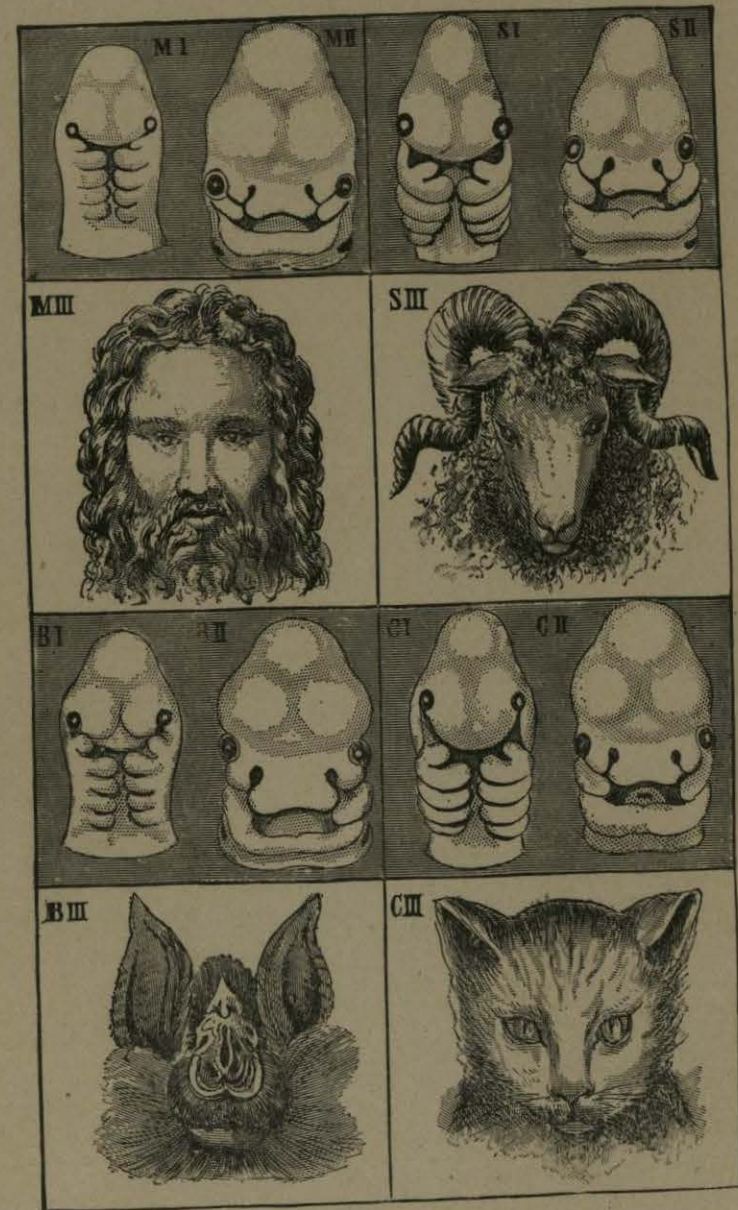
Embryonic Development of a Chicken, a Turtle, a Salamander, and a Fish.

PLATE XLIII.



Embryonic Development of a Man, a Rabbit, a Calf, and a Pig.

PLATE XLIV.



Embryonic Development of the Face, in a Man, a Cat, and a Bat.

Sometimes particular features are more perfect among the apes than among the lower varieties of human beings, as in the case of the nosed apes, Figs. 198, 199.



FIGURE 198.—*The Nosed Ape.* FIGURE 199.—*Julian Pastrana.*

Here we have the *Nose Ape* from Borneo contrasted with the celebrated *Julian Pastrana*, the ape man. In this case not only is the ape the better of the two in regard to the nose, but even in the whole facial development.



FIGURE 200.—*African Woman.*

Fig. 200 shows the peculiar development of some of the African women referred to at page 732.