rubbing of the jaws on the horn had produced two bald patches on the skin.

3 *Inflammatory enlargement.*—The distinctions between hypertrophy and increased size the result of inflammation, acute or chronic, are so obvious that it is difficult to understand how the two conditions can be misinterpreted; yet it is so. We hear of the hypertrophic form of cirrhosis, hypertrophic emphysema, hypertrophy of the prostate; even bones thickened from periostitis and ostitis deformans are described as examples of hypertrophy. Such loose method in the application of terms should be sedulously avoided; it is productive of error. The consideration of the specimens described in this paper ought to be sufficient to convince anyone that hypertrophy, overgrowth, and inflammatory enlargement are in no sense identical. Hypertrophy is a very salutary process, and in many instances is essential for the preservation of life. Overgrowth is at its best an inconvenience, and often disastrous; the same applies to inflammatory enlargement. In another place I have discussed the important part played by hypertrophy in evolution and have in consequence avoided it here.

In concluding this paper it may be of some interest to draw attention to a few points connected with overgrowth of hair. The skin of all mammals is furnished with hair or its modifications; the amount of hair may be very small in such forms as the whale, porpoise, elephant, and man. Few mammals have less hair than man, and in no member of man's class (mammalia) has hair a similar distribution. Even the quadrumana, which anatomically and zoologically approach man so closely, in the distribution and amount of hair differ from him very widely. In the apes, if deficiency occurs anywhere, it is on the ventral aspect; in man the reverse of this pertains, for the back is as a rule naked. It is scarcely correct, however, to make this statement emphatically, for the skin is in most parts of the body usually covered by a crop of thin downy hairs, which in such situations as the tip of the nose may be of excessive tenuity. In exceptional cases the hair on the general surface of the body may attain a considerable length and thickness; in rarer instances it may even be furnished with an aftershaft, an event very common with feathers. Hairy men such as Esau are not uncommon. It is well known that when the skin is persistently irritated, as by the application of poultices, the hairs in the neighbourhood may grow actively, and attain an abnormal length. All forms of local hairiness induced in this way must be regarded as overgrowth, the result of increased blood supply to the part in consequence of irritation. This is very well shown in the abnormal growth of hair occasionally seen on the forearm in some cases of arterio-venous aneurysm. Perhaps the most remarkable form of hairiness is that accompanying some cases of spina bifida occulta, and is probably due, as Virchow believes, to irritation of the spinal nerves in the region of the defect. In patients with a hidden spina bifida it is not uncommon, but by no means constant, to find a hair-field in the loins, the individual hairs of which may be very long; the abnormal growth may affect a very limited area. At other times the overgrowth is distributed over a very wide area, extending from the loins to the buttocks and down the thighs. In this variety the hairs are much shorter than in the first-mentioned condition. Persons with this form of spina bifida are not infrequently the subject of perforating ulcer on one or both feet.

In October, 1884, Virchow communicated to the *Berliner medicinischen Gesellschaft* a paper of very great interest on "Schwanzbildung beim Menschen," wherein he drew attention briefly to the statues and mythological narratives representing the satyrs and "gods of the woods," with tufts of hair for tails. Virchow suggests that the sculptors and artists did not trust entirely to their own imaginations, but that these oddities had a certain amount of foundation in fact. There is much to support this view of the matter, and I was induced to look into it. The sylvan deities consist of two varieties, *Fauns* and *Ægipans*. In fauns we find sprouting from the loins a hairy tuft. In the case of the ægipans, we have always the body of a man with long-pointed ears, attached to the hind quarters of a goat, and a long tuft of hair in the loin. The combination is well represented in Fig. 7, showing an ægipan supporting a faun on its foot. The hairy tuft needs no further explanation, and the notion of hairy legs may have originated from those cases in which remarkable hair fields occasionally exist on the limbs, as complications of the spina bifida occulta. The

notion of the cloven hoof admits of a twofold explanation. In the first place, the distortion of the foot in the position of talipes equino-varus may have stimulated the imagination; or, in the second place, as Recklinghausen suggests, that, as the condition is so frequently complicated by perforating ulcer, and this disease leads to destruction of the metatarsal bones and loss of a few toes, a fancied

FIG. 7.

An ægipan supporting a faun.

resemblance to a cloven hoof originated. Nor is this merely supposition, for I have seen the second, third, and fourth toes thus destroyed, the big and little toes alone remaining, the first having a very suggestive cloven appearance. In conclusion, it is not unfair to infer that from such sources as these originated the familiar corporeal form of our much-dreaded mystical devil, with hairy body, cloven feet, and tail.

THE PATHOLOGY OF INFECTIOUS AND INFECTIVE DISEASES,

AS ILLUSTRATED BY THE FACTS OF INHERITANCE.

By JOSEPH COATS, M.D.

(Continued from p. 11.)

I HAVE adduced the foregoing examples of inheritance of morbid conditions somewhat in detail, in order to supply a basis for my further observations. I apprehend that these instances in the first place afford demonstration of the fact of inheritance, while in the second place they indicate that the matter of inheritance consists in more or less minute structural or physiological details. It is a peculiarity in the formation of the epidermis, as in ichthyosis; or in the structure of the bloodvessels, as in hæmophilia; or in the structure of the retina, as in Daltonism; or in the innervation of the muscles of the eye, as in squinting; or in the condition of the blood and kidneys, perhaps dependent on the condition of certain nerve centres, as in diabetes insipidus. Just as in the case of inheritance of normal characteristics, so here in morbid peculiarities, the fertilised ovum begins its career with specific forces, certain of which result in divergences from the normal.

INHERITANCE OF INFECTIOUS AND INFECTIVE DISEASES.

And now in approaching, after this long introduction, the subject which forms more particularly our theme, we may expect to find that if inheritance plays any part in infective and infectious diseases, it must do so on principles consistent with those which I have adduced.

The first observation I have to make is that *race* plays a very important part in the etiology of this class of cases.

A very striking experimental demonstration of this was afforded by Koch in his very remarkable work on Traumatic Infective Diseases.¹ One of the most interesting of his series of observations is that in which, by inoculating mice with putrefying blood, he induced a specific acute infectious disease. There was a period of incubation of about twenty-four hours, after which the animals took ill and died in from forty to sixty hours. The blood of mice which have died in this way is in the highest degree infectious. The author says: "I have often performed the following experiment. The subcutaneous tissue of a mouse which had died after inoculation on the tail was touched with a knife on the opposite part of the body to that which had been inoculated—namely, on the head,—and with this instrument a small scratch was made on the ear of another mouse. The animals thus infected died, without exception, of the same disease."

Now, it is a fact of great importance for our purpose that while this disease was extremely virulent in the case of the ordinary mouse, it was quite innocuous in the case of the field mouse. Here is an animal closely allied to, and scarcely distinguishable at a first glance from, the ordinary mouse, but in regard to this infectious disease it presents the greatest possible contrast. Koch ascribes this difference to the differences in the blood of the two animals. In the case of the house mouse crystals seldom form from the blood, whereas in the case of the field mouse a drop of blood soon begins to undergo changes. The red corpuscles become transformed into large hexagonal plates, and thus the drop becomes transformed into a crystalline pulp. The important point for our purpose is that a difference in the condition of the blood has the effect of rendering an animal insusceptible of a disease which is extremely virulent in a nearly allied animal. As further illustrating this subject from the experimental side, I may cite the observations of Chauveau on splenic fever or anthrax.² It is well known that this disease is inoculable into a large number of animals of different species, and that these present great differences in their susceptibility to the disease. But even the same species was found by Chauveau to present in the different races a striking difference in susceptibility. In ordinary sheep a simple inoculation with the lancet of the fresh blood or other infective matter was sufficient to induce the disease, but when he came to experiment with sheep from Algiers he found that they did not usually become affected by this simple inoculation. In order to produce it a much larger quantity of the infective matter was required. Similarly, Pasteur, in his experiments with chicken cholera, found that while ordinary fowls were highly susceptible, those of the Cochin China breed were hardly at all so. In all these cases we have experimental proof that apparently slight differences in structure, such as those which make up racial variations, are sufficient to determine extreme differences in susceptibility to the class of diseases which forms the subject of this paper.

Turning to man, we have no less striking proofs of varying susceptibility among the different races, and even the different families of mankind. I may here refer to a fact which bears, at least by analogy, on the present subject. I suppose that in a certain sense the "plague of lice" is an infectious disease. Well, I find in Darwin's "Descent of Man" (second edition, 1874, pp. 169-70) that the different races of man present great varieties in the species of pediculi which afflict them. He says: "Mr. A. Murray has carefully examined the pediculi collected in different countries from the different races of man, and he finds that they differ not only in colour, but in the structure of their claws and limbs. In every case in which many specimens were obtained the differences were constant. The surgeon of a whaling ship in the Pacific assured me that when the pediculi with which some of the Sandwich Islanders on board swarmed strayed on to the bodies of the English sailors they died in the course of three or four days. These pediculi were darker coloured, and appeared different from those proper to the natives of Chiloe in South America, of which he gave me specimens. These, again, appeared larger and much softer than European lice. Mr. Murray procured four kinds from Africa—namely, from the negroes of the eastern and western coasts, from the Hottentots and Kaffirs; two kinds from the natives of Australia; two from North and two from South America."

Of the great group of zymotic diseases, when we come to

look into the relative susceptibility of different races, we find that, in the case of some of them at least, there is very strong evidence of difference in susceptibility. In this inquiry I am much indebted to Hirsch's Handbook of Geographical and Historical Pathology, recently translated by the New Sydenham Society. This work contains a mine of information such as only a German could have presented. I observe that Hirsch in his sentiment is rather averse to admitting the influence of racial peculiarities in determining various degrees of susceptibility, and that he minimises this influence as much as possible. He is, however, compelled to admit the facts of the case against his own inclinations.

I think the most undoubted and typical instance is afforded by the case of *yellow fever*. This disease has a very definite and somewhat limited geographical area of distribution. It is a disease mainly of the West Indies and the neighbouring parts of North and South America. It is of some consequence for what follows to remember that, although somewhat widely distributed in America, it occurs in a much more limited area in the old world. In the words of Hirsch, "If we disregard the quite isolated outbreaks in the south-west of Europe, it is met with at one point only—viz., the west coast of Africa." Now, all authors are agreed that negroes present a singular immunity to yellow fever. In a work entitled "The Indigenous Races of the Earth," by various authors,³ there is an article on the comparative influence of climate and of endemic and epidemic diseases on the races of men, by an American physician, Dr. J. C. Nott, in which a large amount of valuable information is given in regard to yellow fever. He says, for instance, "I have seen the disease prevail five times at Mobile, and have attended several hundred cases among the whites, but not a single well-marked one in a pure-blooded negro, and not more than two or three in mulattoes." Then, again, he says: "The smallest admixture of negro blood, as in the Quarteroon or Quinteroon, is a great though not absolute protection against yellow fever." There are numerous other authorities to the same effect, which may be found in Hirsch's book, vol. i., pp. 344 and 345. Fenner, for example, is quoted as saying: "The least mixture of the white race with the black seems to increase the liability of the latter to the dangers of yellow fever, and the danger is in proportion to the amount of white blood in the mixture." Hirsch here admits that we have to do with a congenital immunity in the negro race. There are two possible ways of explaining an immunity such as this. In the first place, it may be that in certain countries yellow fever is so prevalent that nearly everyone is attacked. We know that one attack of this fever confers immunity on the individual against a second attack, and it may be that this immunity may be transmitted to the offspring. There is, in the second place, the possibility of a true racial characteristic similar to the immunity of the field mouse to septicæmia and of the Algerine sheep to anthrax. In the case of yellow fever there can scarcely be a doubt that the second view is the true one. One can hardly suppose that a whole race could acquire immunity from its ancestors having been affected. It is true, indeed, that, without having been attacked by the disease, even Europeans residing in yellow fever districts acquire a certain power of resistance—become, as it is said, acclimated. Freshly arrived individuals of any European stock are more liable than the old residents. But this does not approach to the immunity of the negroes; and even the Mexican Indians, who have lived for generations in the yellow fever zone, have apparently no greater degree of protection than European residents. Nott says "the American Indians of the table lands, as the Mexicans and the mixed bloods of Spaniards and Mexicans, are infinitely more liable to yellow fever than mulattoes of any grade." There is a further striking proof of this view in what may almost be regarded as an experiment on a large scale. It is to be remembered that the home of the negro race in Africa is only to a limited extent within the yellow fever zone, and yet negroes from all parts of Africa present a similar immunity to the disease. In the French expedition to Mexico the French troops were so decimated by yellow fever that it occurred to the French Government to get a battalion of black troops from the Viceroy of Egypt. This battalion, consisting of about 500 men, was recruited in the Soudan, coming chiefly from the parts between Berber and Khartoum. The result

¹ Translated by the New Sydenham Society, 1880.

² Comptes Rendus, 1880, vol. i., p. 15.

³ London, 1857.

was watched with much anxiety, and it was found that, though these men came from a district far off from the yellow fever zone, yet not a single case of yellow fever occurred while they were in Mexico, where they were in the fever zone all the time.³ We may, I think, legitimately infer that there is something in the racial characters of the negro which renders him peculiarly insusceptible to the virus of yellow fever. It is consistent with this view that in severe epidemics the negroes suffer, although to a much less extent than Europeans, as if the virus in an intensified form were able to break down the barriers opposed to it. A similar insusceptibility seems to be possessed to a less degree by other dark races—the Chinese and Hindoo coolies. A friend of my own in the West Indies tells me that it is so.

In regard to *malarial fevers*, the negro presents apparently much less liability than other races, although not nearly to such a degree as in the case of yellow fever. In the words of Hirsch, "the Ethiopian race, although it by no means enjoys an absolute immunity from the disease, is still affected by it, *ceteris paribus*, less frequently, less readily, and less severely than other races." In illustration of this I may quote the well-known statistics of Major Tulloch,⁴ in which he compares the mortality of British and native troops on the west coast of Africa. The difference in the mortality is essentially due to different degrees of susceptibility to malarial fevers. Taking all the stations in western Africa, out of 1685 white troops who arrived in the years 1822 to 1825 there died between the years 1823 and 1827 no less than 1298, while 387 were invalided, of whom 17 died on the passage home. Thus of those who went out there died by the end of five years 1315 out of 1685. This extreme mortality was not confined to the private soldiers, but the officers succumbed almost in like proportion; every year about a fifth died, and another fifth were invalided. On the other hand, the black troops were almost exempt from fever. From 1819 till 1836 inclusive, the mean strength of black troops was 7581, and the annual mortality was only 228. This is surely a very striking contrast. Some part of this difference is doubtless due to acclimatisation. It is known that the natives of malarious districts are less susceptible than strangers, although no one ever acquires an absolute immunity. According to Hirsch, negroes have frequently malarial fever in childhood, and part of the immunity of adults may be due to this. But, taking all the effects of acclimatisation into account, the negro shows a degree of immunity which no other race can boast of. In Hirsch's book there is a table, the source of which is not very apparent, showing the proportion of deaths from malarial fever in Ceylon according to race. There died per 1000 of the population—negroes, 1.1; natives of India, 4.5; Malays, 6.7; natives of Ceylon, 7; Europeans (English), 24.6. It is clear from these facts that the negroes enjoy a remarkable degree of immunity from malarial fevers—greater, indeed, than the natives of the malarial districts themselves.

As a contrast to this we have the fact that the negroes are more susceptible to *small-pox* than Europeans. My friend in the West Indies tells me that when during an epidemic of yellow fever the negroes rejoice over their immunity, the Europeans reply, "Wait till small-pox comes, and then it will be your turn." There is abundant evidence of the great susceptibility of the negroes. Let me here quote a paragraph from Hirsch. "The members of the human family," says Pruner, "that are most susceptible to the poison of small-pox are the negroes. Not only in their native lands, but in other parts of the world as well, they are the first to succumb to the epidemic influence, and also the last. It is no unusual thing to see negroes attacked by small-pox as soon as they arrive in Egypt (where they certainly change their way of living as well as the climate), and that, too, at times when the disease does not exist among the other inhabitants." Similar statements as to the increased intensity of the disease in the negro are made for the west coast of Africa, for Martinique, for Curaçao, for Cayenne, and for Peru. In Boston there died in the epidemics of 1649-1762, or at a time when there was no question of protection by vaccination, 10.8 per cent. of white patients and 23.7 per cent. of black. In the epidemic of 1850 at Baltimore, the proportion of deaths among 10,000 white inhabitants was 8.1, and among negroes 14.5."

In regard also to *cholera* there is almost complete unanimity that negroes are much more susceptible than other races.

Dr. Christie, of this city, who has had great experience of this matter, says, in a private memorandum referring to his experience on the east coast of Africa. "During an epidemic of cholera the more primitive races seem to be attacked most acutely, and a fatal result frequently ensues within a few hours after the first appearance of the symptoms. I have seen many instances among negroes in which death occurred without vomiting or diarrhoea, but I have never seen such cases among Europeans, Arabs, or natives of India. Natives of India seemed to me to have a greater tolerance of the disease than those of other countries." You will find in Hirsch a great body of evidence confirmatory of these views. In the United States army in 1866, for example, cholera was fatal in 77 per 1000 of the white troops and 135 of the black.

Having dwelt in some detail on the varying susceptibility of the different races to the infectious diseases, I may advert somewhat briefly to the influence of race on susceptibility to syphilis and tuberculosis. It appears that negroes possess an almost absolute immunity to *syphilis*. In Hirsch⁵ there is abundant evidence of this. He gives the very striking example of Madagascar. In this island syphilis is unusually prevalent, but it affects almost exclusively the Hovas, who are a Malay race, while the Malagasy, who have the characters of the negro race, enjoy an almost absolute immunity. Livingstone also noted that "it seems incapable of permanence in any form in persons of pure African blood anywhere in the centre of the continent." The inhabitants of Iceland and Greenland seem to possess a similar immunity.

In regard to *tuberculosis*, there is quite sufficient evidence that the negro, especially when he comes into a colder climate, is particularly liable to pulmonary consumption. Hirsch gives references confirmatory of this from almost every country to which the negro has migrated. He states also, on the evidence of Baer, that "in the convict prisons of the United States from 1829 to 1845 the average mortality from phthisis among prisoners of the white race was 11.16 per 1000; but among the negroes confined in the Eastern Penitentiary of Pennsylvania it was 40.74, and in the Maryland Penitentiary 28.49." Hirsch also gives a table showing the comparative prevalence of phthisis among British and European troops in various localities, from which it appears that, while at Jamaica the mortality is only slightly greater among negroes, it presents a very great contrast at Gibraltar, being 6.1 per 1000 for British troops and 33.5 for negro.

Negroes show a similar liability to *leprosy*. "All observers agree that in countries with a mixed population, such as the West Indies, the Guianas, the Bahamas, Zanzibar, the Mauritius, India, Ceylon, and the Argentine States, the disease is commonest among the negroes and those of mixed blood, and rarest, if not absolutely rare, among the Europeans."⁶

(To be concluded.)

COMPOSITE ODONTOME OF THE UPPER JAW; REMOVAL.

By JORDAN LLOYD, F.R.C.S.,

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TRUE ODONTOMATA, judging from the few cases recorded, are probably not of very frequent occurrence. I have Mr. Heath's authority for saying that up to the present time only nine have been published, and all were in connexion with the lower jaw. My case, therefore, appears to be absolutely unique, and deserves on that account to be fully reported. I am indebted to my friend, Mr. Adams Parker, for the patient.

T. M—, male, aged twenty-one years, agricultural labourer, was admitted into Queen's Hospital on October 4th, 1887. He is a robust, healthy countryman, and seems to know very little of the history of the condition for which he is under treatment. He says that a long time ago he had a blow on the right side of the upper jaw, but had forgotten all about it until the direct question was put to him. About six weeks since he had toothache in the right upper molars, and noticed shortly that his face and right eyelid were swollen. Two or three days afterwards an attempt was made to extract a tooth, with the result, so he says, that it was broken in the endeavour. About this time he first

³ See Pouchet: De la Pluralité des Races Humaines (Paris, 1864), p. 89.

⁴ Statistical Society, 1840.

⁵ Vol. II., p. 76.

⁶ Ibid., p. 55.