

pointed governors of the equatorial Nile basin. They succeeded in stamping out the trade in the province of Equator, which was annexed to Egypt in Baker's time. This province was inhabited exclusively by pure negroes; while Bahr-el-Gazelle, where Schweinfurth lived so long, contained a large number of Arabs of more or less pure blood.

Baker and Gordon undoubtedly suppressed the slave trade of the White Nile, so far as it was carried on by water; but how much the poor slave was benefited is another question. Probably not much; for the overland march through Darfur and Kordofan must have been more destructive of life than even the voyage in a crowded Nile nugger.

One of the most powerful of these ruffian kings of Bahr-el-Gazelle was Seebehr Rahama, whose seribas were near the Darfur boundary. It was during Schweinfurth's stay in the Bahr-el-Gazelle country that Seebehr attacked and defeated some government troops who had been sent to take possession of a portion of southern Darfur. Seebehr himself then undertook the conquest of that country. The Egyptian government, thoroughly alarmed at his growing power, sent an army to co-operate, and Darfur was annexed to Egypt. This was in 1874.

Darfur, the land of the Fur, is situated between 9° and 16° north latitude, and 22° and 28° east longitude. Its area is about one hundred and five thousand square miles. Very little is known of the country; but the following facts, gleaned from Dr. Nachtigal's communication to the French geographical society in 1876, may be of interest. The population, estimated at about four millions, is as mixed as that of the other central Sudan provinces. The Fur, who live in the highlands, speak a language of their own. They are stigmatized by Nachtigal as proud, vain, cowardly, treacherous, and as disagreeable as the Wadai on the west. They are black, of moderate height, with regular features, and were the ruling race in Darfur before the coming of the Egyptians. There, as in Kordofan, there are many mixed races, and a large Arab population, especially in the northern and central portions. It must be remembered that these Arabs of the Sudan are not true Arabs, but to a great extent merely Arabized negroes.

After Seebehr had conquered Darfur, he went to Cairo for his reward; but, instead of being loaded with honors, and sent back as governor of Darfur, he was made a pasha, and kept in Cairo on a pension. His followers, led by his son Suleiman, in accordance with a preconcert-

ed arrangement, rebelled; but Seebehr was not sent to quell the rebellion, as he had expected. The revolt was crushed by Gordon's able lieutenant, the lamented Gessi pasha, who became governor of Bahr-el-Gazelle. But upon Gordon's withdrawal, all power to do good was taken from Gessi, and he resigned.

In 1877 the khedive entered into an agreement with England, in which it was stipulated that the slave-trade should cease in lower Egypt on Aug. 4, 1884, and in the Sudan five years later. The rebellious spirit of the inhabitants had been suppressed by Baker, Gordon, and Gessi. It broke out again on the favorable opportunity which the revolt of Arabi pasha afforded. Mahomet Achmet, or El Mahdi, put himself at the head of the movement. A series of defeats was suffered by the government troops. Then came the worst blunder of all. A portion of Arabi's bashi-bazouks were sent to the Sudan under the command of Hicks pasha, a retired English army-officer. At first they were successful; but, when they attempted the invasion of Kordofan, they were surrounded, and cut to pieces. The Mahdi and his followers were supreme except in the immediate vicinity of a few garrisoned towns. It was at this juncture that Gordon was sent by the English government to report on the military situation in the Sudan. On his way he stopped at Cairo, and was commissioned governor-general of the Sudan without pay. His doings there are not known. It will be curious to see, whether when he again turns up, he still adheres to the following opinion, which he wrote just before setting out: "I am convinced that it is an entire mistake to regard the Mahdi as in any sense a religious leader: he personifies popular discontent."

NAVIGATION OF THE AIR.¹

WE have described in detail (*Science*, No. 86) the experiment made at Chalais-Meudon on Aug. 9, when for the first time a balloon returned to its point of departure.

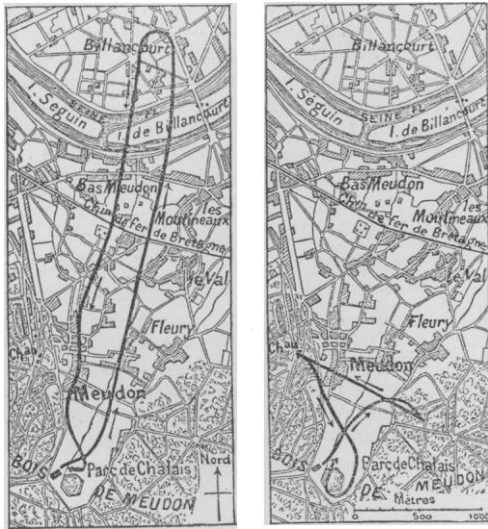
In 1852 Mr. Henry Giffard, in a steam-screw balloon, obtained a speed of about 4 metres a second. In 1872 Mr. Dupuy de Lôme, with a motor worked by seven men, attained a speed of 2.8 metres; and the Tissandier brothers, with the first balloon furnished with an electric motor, a speed of 3 metres in 1883, and of nearly 4 metres in 1884.² Renard and

¹ From an article by GASTON TISSANDIER in *La Nature*, Nov. 15.

² By an experimental trip on Sept. 26, 1884, the brothers Tissandier proved that their balloon could be brought back to its starting-point in calm weather; but, through lack of funds, they

Krebs, by the use of a more powerful and a lighter motor and a long balloon, reached a speed of about 5.5 metres a second in their first two experiments, and 6.5 metres a second in their recent experiments of Nov. 8, 1884, or 23.5 kilometres an hour, with a five-horse power, and fifty revolutions of the screw a minute.

On the 9th of November, says Tissandier, the wind was moving at the rate of 8 kilometres an hour. When the balloon was going with the wind, its speed was equal to 23.5 plus 8 kilometres, or 31 kilometres, an hour: on the other hand, when it went against the wind, its speed was 23.5 kilometres minus 8 kilometres, or 15.5 kilometres, an hour. The balloon was easily guided in all directions.



The first ascent took place at noon. When the balloon had risen above the surrounding obstructions, the working of the screw was begun; and the balloon, tacking about, was directed in a straight line toward the viaduct of Meudon, which it soon reached. It crossed the Seine below the bridge of Billancourt, became entangled on the right bank of the river, and the motor was stopped, and the balloon allowed to go with the wind, in order to measure the rate of the current. After a rest of five minutes, the machine was again put in motion; and the balloon, guided by the rudder, described a semicircle of about 160 metres diameter, and returned to its starting-point at a slow rate, but with perfect stability. At three P.M. Renard and Krebs began a second experiment. The balloon arose a second time, and made several excursions in the neighborhood of Chalais; but the fog was so thick, that the second ascent only occupied thirty-three minutes through fear of losing sight of the landing-place. A return to the place of departure

have not been able to provide a shelter for the inflated balloon, that it might be ready to set out in favorable weather.

was easily effected, as before. The accompanying maps give the exact routes of the two trips.

These new experiments are decisive. Navigation of the air by means of long balloons provided with screws is demonstrated. We will repeat, what we have already said many times, that to be practicable and useful, aerial ships must be made very long, of very large dimensions, which shall carry very large machines, capable of giving a speed of from 12 to 15 metres a second, allowing their working at almost any time. When the wind is high, or there is a squall or tempest, aerial ships must remain in port, as other vessels do. It becomes now only a question of capital.

A NEW LAW OF ORGANIC EVOLUTION.

I HAVE in another place given many reasons for believing that the male cell has, by division of labor, gradually acquired the function of exciting variation, while the ovum transmits the established characteristics of the race. The following facts, among others, seem to indicate that a specialization of this sort actually exists. 1°. There is no evidence that the functions of the two sexual elements are alike, but the possibility of parthenogenesis shows that the ovum in itself can transmit all the established characteristics of the race. 2°. Organisms born from fertilized eggs or seeds are much more variable than those which are produced asexually. 3°. The children born from a male hybrid with the female of either pure form are much more variable than those from a female hybrid with the male of either pure form. 4°. Parts which are confined to males, or which are of more functional importance in males than in females, are much more variable than parts which are confined to females, or which are of more functional importance in females than in males. 5°. Males are more variable than females. 6°. The male leads, and the female follows, in the evolution of new features, as is shown by the fact that the females of allied species are more like each other, and more like the young, than the males are. This cannot be due to sexual selection; for it holds true to a remarkable degree in domesticated pigeons, and in other animals which are paired by the breeder.

Now, if it is true that the tendency to vary comes through the influence of the male parent, it will be for the advantage of the species to give birth to an excess of females, so long as the conditions of life are favorable, and change is not needed, and to give birth to an excess of males whenever the conditions of life become unfavorable, and thus demand new modifications.

Düsing has recently published¹ a very valuable and highly suggestive series of papers upon the laws which regulate the sex of the embryo in mankind, and in other animals, and in plants; and the facts which he has brought together seem to show that this specialization actually exists, and that a favorable environment

¹ *Jenaische zeitschrift*, xvi. iii. 1883, 428, and xvii. 1884, 592-940.