[For the Scientific American].

THE MIGRATORY LOCUSTS AND THEIR AMERICAN COUSINS.

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If the reader will compare the representation of the locust here given with that of the grasshopper in our last number, he will notice, first, that while the antennæ of the latter are very long, those of the former are comparatively short; he will observe also that the female locust wants the sword or saber-shaped ovipositor, and that the male has not the clear spaces at the base of the wing covers that indicate the musical organs of the katydids. He will also discover that the hinder wings have the nervures radiating from the base of the fan-like expanse much more strongly defined—these stiff nervures acting as ribs, and thus affording a firmer support to the membrane, give the locust that power of sustained flight which is the real secret of its existence, in the destructive numbers in which it occurs. This is its advantage in the struggle for existence. The grasshopper, with its weak wings, is limited in its range for food, and the numerical development of its kind is thereby correspondingly restricted; but, as the evidence of Dr. Sincecum shows, with the locust the case is different. That writer tells us of the *Caloptenus spretus*, a species that ranges from the Mississippi to the Pacific, and from the Saskatchewan to Texas, that in Texas "the young were hatched from the egg in the early days of March; by the middle of the month they had destroyed half the vegetation, although the insects were wingless and not larger than a house fly."

It seems evident that had not the most forward of such a host the means, on arriving at maturity, of removing themselves to pastures new, they would speedily eat themselves and their less developed brethren literally out of house and home, and, we may add, their race out of existence. In fact, we presume that vast numbers of them must perish of starvation in their infancy, yet countless multitudes are left to fly off to other regions often very remote; a migration that still leaves enough to propagate the evil in the original locality. And the power of flight possessed by these insects is really remarkable; there are numerous instances, undoubtedly authentic, of their having been met with at sea several hundred miles from land, and, giving currents of air all the credit we can for aid and assistance, yet we must still be surprised at the time such small creatures are able to sustain themselves on the wing.

"If the locusts want the musical apparatus of the grasshoppers, they are not the less," says Professor Blanchard, "good musicians." The difference is, that while the latter perform on instruments *sui generis*, the former are undoubtedly fiddlers; to quote Harris, whose account is at once so full and clear that there is no improving on it, "their hind legs being the bows, and the projecting veins of their wing-covers the strings. But besides these they have on each side of the body in the first segment of the abdomen, just above and a little behind the thighs, a deep cavity closed by a thin piece of skin stretched tightly across it. These probably act in some measure to increase the reverberation of the sound like the cavity of a violin. When a locust begins to play, he bends the shank of one hind leg beneath the thigh, where it is lodged in a furrow designed to receive it, and then draws the leg briskly up and down several times against the projecting lateral edge and veins of the wing cover."

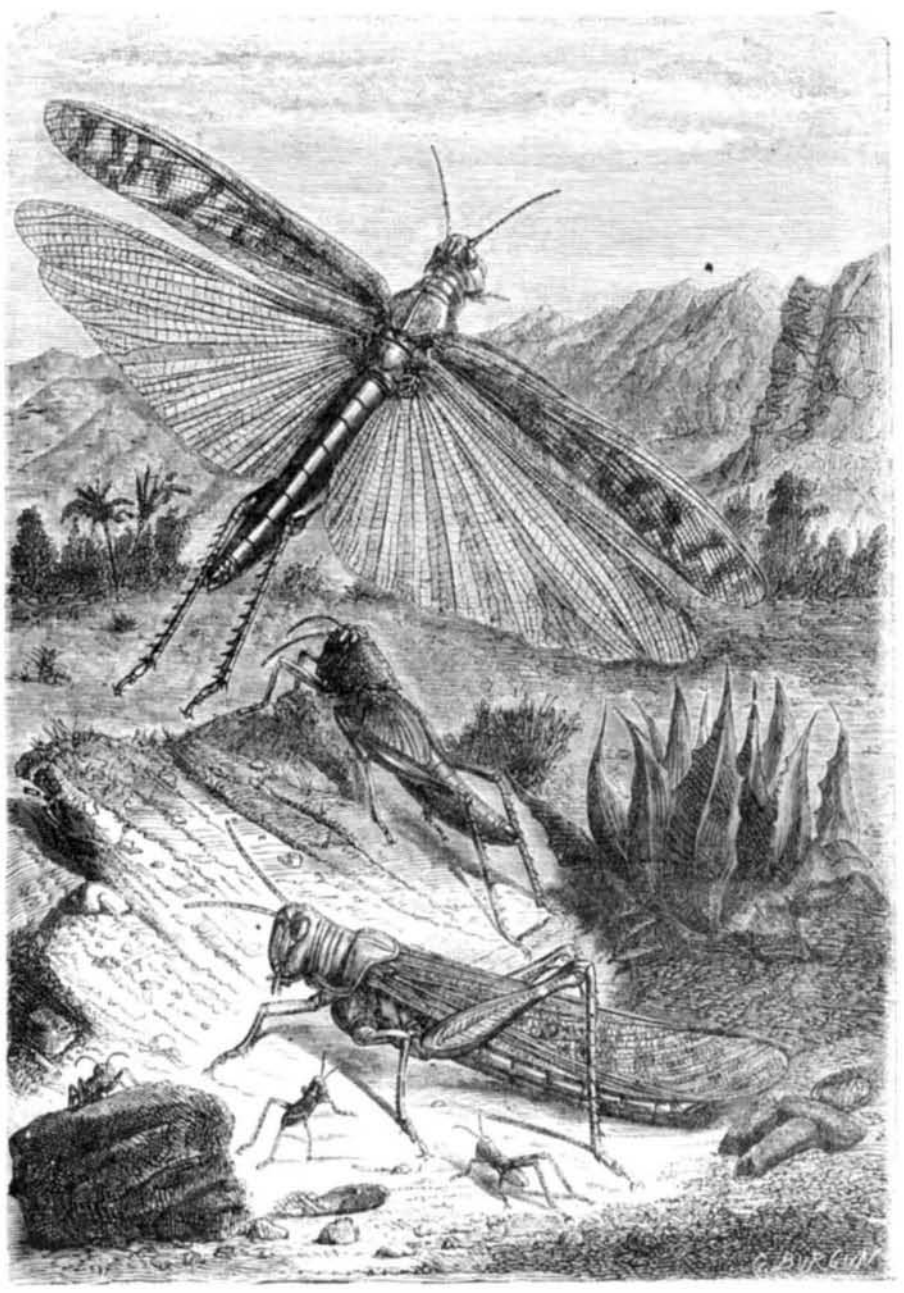
But he has a pair of these violins, so Harris adds: "He does not play both fiddles together, but alternately, for a little time, first upon one and then on the other, standing meanwhile upon the four anterior legs, and the hind leg not otherwise employed."

We have said that the female locust wants the elongated ovipositor of the grasshopper; she has, however, a smaller piece of mechanism by which she is enabled to open a hole in the ground, and into this aperture she gradually inserts her abdomen, depositing her eggs in little tubular cases, consolidated from a sticky secretion. These little cases are represented on the ground behind the female locust in the accompanying cut.

Of the ravages of the locusts, bringing famine and pestilence in their train and causing the death of human beings by the thousand, and it is even said the million, at a single visitation, we have not room at present to select even a few examples. The statements of antiquity have been corroborated by the sad experience of modern times, and the worst species of the Old World are represented by closely allied forms in the New, where we have probably yet to learn the full amount of evil that a wide-spread locust year may do to our rapidly increasing and vital expanse of cultivation.

The most mischievous locusts are divisible into two great genera. The one called *Acridium* (now cut up into several subdivisions) includes the *A. peregrinum*, figured herewith, one of the "migratory" locusts of the Old World and the common red-legged locust of our Eastern States as well as the *Caloptenus spretus* spoken of above. These have on th under side of the thorax a "blunt spine or tubercle," which is absent in the second genus *Œdipoda*. The latter is represented among others by the large Carolina locust that swarms around us at this season, in every walk we take—its dusky wings edged with pale yellow bringing it prominently under notice, and here also belongs the most terrible of the locusts of the Old World, *Œ. migratoria* or the true migratory locust.

Perhaps some of our readers may be prompted to examine the structure of one of these by no means uninteresting insects; if he catches one for the purpose, he will find that the captive resents the seizure by "spitting" upon him. What the nature of this discharge may be we do not know, but it does look amazingly like tobacco juice! The locust "spits" as well as "chews," but it chews the green, clean leaf, and not—well, we won't explain this time, and it spits only in fear and probably self-defense. We never saw one that did chance to fly in at the window desecrate, without provocation, a Brussels carpet or a clean floor, nor if one (quite unintentionally you may be very sure) dropped into a street car, would it celebrate its advent on a lady's dress by expectorating thereupon, that is, if sensibly let alone. We respectfully beg to offer this polite example of a despised insect to all whom it may concern.



METAMORPHOSES OF THE MIGRATORY LOCUST.

From the New York Daily Times.

THE SCIENCE OF GOING TO WAR—HOW PRUSSIA IS SUPERIOR TO FRANCE.

It is scarcely possible to over-estimate the advantage which the Prussians have gained within the last fortnight. They have destroyed the confidence of the French in their generals, and are now pursuing defeated and drooping armies with an elated and overwhelming force. Only very enthusiastic Frenchmen can suppose that the Emperor Napoleon is retiring for tactical purposes. If he could not cover Paris at Metz, he stands far less chance of being able to do so at Chalons. Every inch of ground which he is obliged to give up to the Prussians is an immense advantage to them, and a great loss to him. It is the side which is pursuing an offensive campaign that stands the best chance of winning in the end. When this month opened, Napoleon seemed to have this element of success in his favor. In six days he lost it, and ever since then he has constantly been obliged to recede before the irresistible pressure of the Prussian hosts. That he is out-numbered, we have no doubt. But how will he justify himself before the French people for entering upon a war for which he was so fatally unprepared?

The superiority which the Prussians have thus far shown, they seem likely to retain until the close of the war. Some people appear to suppose that the disproportion in numbers between the Prussian and French armies will disappear as the campaign goes on. We believe, on the contrary, that it will remain very much as it is now—or that if any change be made, it will be in favor of the Prussians. They have a more efficient system of keeping their forces at a given level than the French. As soon as the mobilization of the Prussian armies takes place, depots of reserve are formed all over the country. Supplies of men and horses are dispatched from these depots to the front on the first day of every month, the number being calculated on an accurate estimate, based upon carefully prepared statistics. The soldiers thus constantly gathered in to make up losses in the field are one half called up from the Landwehr—men who have already served, and know their duties—while the other half are recruits. They leave the depots provided with everything they need, so that they are ready for service the moment they reach the front. This is the system which has called forth the enthusiastic praises of every foreign observer who has carefully studied the organization of the Prussian army. Levies of raw recruits cannot cope with a force raised in this scientific manner.

There are the French fortresses, it is true, but they are useless while the French armies are held in check. It seemed impossible, a fortnight ago that Prussia would be able to isolate Metz without an effort. Yet that is what she seems to be doing now. She can afford to detach from her main armies a force sufficient to give employment to the French troops in Metz. The invading force can thus march on, and the army inside Metz could neither follow it nor cut off its retreat if worsted in open engagements. This is the experience of Prussia in the Austrian campaign. She had then smaller fortresses to deal with than she has now, but, on the o her hand, she has larger armies at her disposal. "Josephstadt and Königgrätz," says Capt. Hozier, "did not delay the Prussian armies for a day, though they are both strong places, and would possibly have stood a long siege; but they were both masked by detachments the loss of which from the line of battle was hardly felt by the main body, and though no trenches were opened, and no guns mounted against them, the great line of the Prussian communications passed in safety within a few miles of their paralyzed garrisons." This operation, on a larger scale, the Prussian commanders are now adopting in dealing with Metz. For this, as for everything else, Napoleon seems to be "unprepared." But that explanation will not soothe France under the disastrous blows which are being inflicted upon her.

The Prussian losses are filled up as fast as they occur. The French seem to be under the impression that the forces they first sent into the field would be amply sufficient to finish the war. It was only under the surprise and alarm of the first great reverse that they began to talk of "filling up the void" in the army. Within a month after the Prussian army marched to the field, the first supply of men from the depot reserves was forwarded to the front. There was no waiting for telegrams or orders. The reserves are forwarded at stated intervals, whether they are wanted or not. The French armies have not only been weakened by heavy losses, but further depleted by the necessity of detaching large forces for the defense of Strasbourg, Metz, and other places. Again, the French commissariat system seems to have completely broken down, just as the English system did in the Crimea—when the only breakfast served out to men who had spent a bitter winter's night on the bleak hill sides was green, unroasted coffee. Now the Prussian commissariat cannot fail in this way. It would take too long to describe the method upon which it is organized—but, as was proved in 1866, its success is assured from the first moment of the war to the last.

These are some of the points in which the Prussians have an advantage over the French. They help to explain the many discomfitures already sustained by the French; and incidentally they show how absurd was the sympathy lately expressed for "poor Prussia," because Napoleon had taken her "by surprise." A nation in which every able-bodied man, except clergymen, is obliged to serve in the army, and which has the finest military organization the world has ever seen, cannot very well be taken by surprise. Count Bismarck, while no doubt very thankful for the good wishes which greet him and his cause from this country, must have been not a little amused with the idea that Napoleon had outwitted him, and had forced war upon a country intent only upon the arts of peace.