found that at least five out of the nine had "put in an appearance."

But perhaps the strangest instance of the possession of some sense unknown to us, occurs in the case of the parasitic wasp Leucopsis (*Leucopsis gigas*). Leucopsis lays her eggs in the cells built by the mason bee Chalicodoma. The cell of this bee is placed in a mass of solid masonry, a part only of which is occupied by cells. Every cell is built with hard mortar, making an uneven surface, and access is rendered even more difficult by a layer of sun-baked clay spread over the whole. Leucopsis has perhaps to work uninterruptedly for three hours with the tools nature has furnished, to penetrate the defense provided by the mason bee for the egg and food stored in the cell. But the covering is uniform over the whole structure. How is Leucopsis to know that after all her work may not be in vain; that she may not penetrate masonry that covers no cell? This problem is easily solved by the wasp, who walks slowly and, so to speak, thoughtfully over the clay, tests it with her antennæ, and unfailingly selects the right spot to begin her work, which of course is to obtain access to the larvæ of the mason bee, upon which her young will feed when the egg she lays there is hatched.

It is, to make the matter plain, as if a person were able to determine by feeling of the walls, three or four feet thick, of a prison, just where cells tenanted by the prisoners were situated.

Examples of insects that possess an X-ray sense, not only among European but our own *hymenoptera*, can be multiplied indefinitely. Only one or two of the senses peculiar to the lower animals are here noticed. Lubbock suggests that "there may be fifty of them."

I do not know any more interesting field for zoological research and experiment than this—a field open to any one who has the requisite patience and love of nature to explore it.

ARTEMIEV'S ELECTRICAL COAT OF MAIL.

BY EMILE GUARINI.

The Russian physicist, Prof. Artemiev, recently delivered a lecture before the German Association of Electrical Engineers, in which he exhibited and described his garment for affording protection against high electrical tensions.

The object of this garment is to avoid all the inconveniences and dangers which accompany the use of protecting gloves. A glove protects but a small part of the body, so that other parts of the body may come into accidental contact with high-tension conductors. The protection afforded is therefore inadequate. Furthermore, the thickness of the rubber of which gloves are made is such that absolute freedom is not possible. Invisible defects in the material of which the glove is made may give but an illusory protection. The tests which were made at the time of the open contest in France two years ago fully demonstrated the inadequacy of the rubber glove.

Artemiev proposes to protect not simply the hands, but the entire body. He has devised an envelope, impenetrable to electrical masses capable of producing electrostatic discharges. By means of this garment it is possible to conduct to the earth any high tension current with which the person who wears the garment may have come in contact. The garment also places in short circuit two parts of the body which may be in contact with high but different potentials.

These results are obtained by Artemiev by a very pliant coat of chain mail, somewhat similar to that worn by the knight of the Middle Ages.

Fig. 1 shows the effect of the protective coat when placed in the secondary circuit of a transformer of which the tension is 150,000 volts. The spark is produced between the hand and the pole of the transformer, without the slightest danger to the wearer of the coat. In the other hand a conductor is held connected by a spark with the other pole of the transformer.

In Fig. 2 the metallic coat plays the same part as a metallic conductor which breaks the spark of an oscillator. Although the tension is excessively high, the wearer of the coat is in no wise injured, although

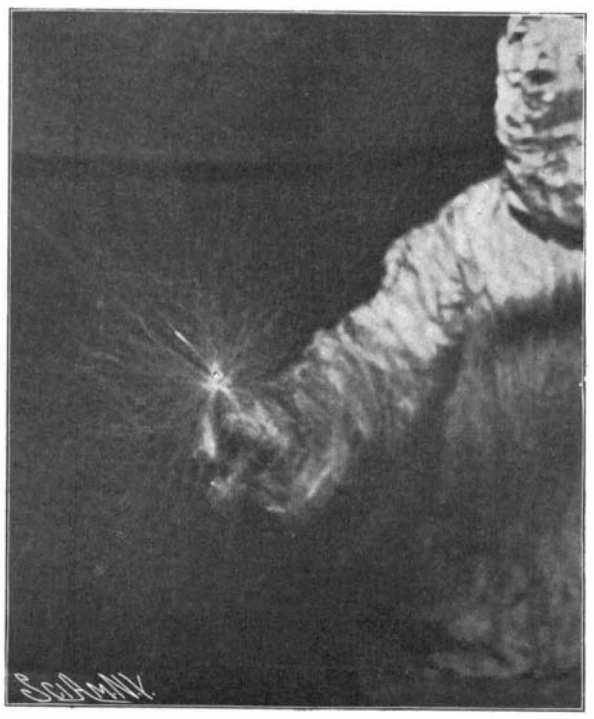

Fig. 3.—A DISCHARGE BETWEEN A CONDUCTOR OF HIGH TENSION AND THE PROTECTED HAND.

he is insulated from the soil which is in more or less good contact with him.

Fig. 3 shows the discharge between a conductor of high tension and the hand of the wearer of the coat. The protecting garment is connected with the earth by reason of the contact established by the feet with the soil.

During the course of these experiments, which were made by the well-known firm of Siemens and Halske of Berlin, it was decided to ascertain what amount of heat developed by passing a current of high tension through the garment. It was thought that if too great a heat were developed the consequences might be serious for the person who happened to wear the coat, and might result even in burning him alive.

Fig. 1.—THE COAT OF MAIL SHIELDING ITS WEARER FROM A TENSION OF 150,000 VOLTS.

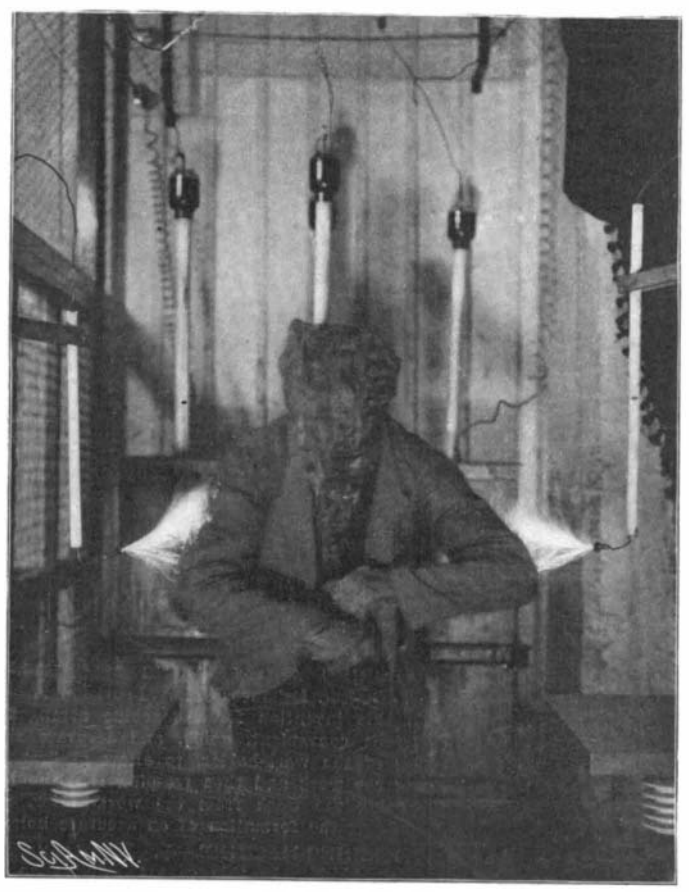

Fig. 2.—THE COAT OF MAIL ACTING AS METALLIC CONDUCTOR TO BREAK THE SPARK.

It was found as a matter of fact that some heat was developed.

The results obtained during the experiments are most valuable. It was found that when the coat's resistance between the two hands was 2-1,000 w., a current of 350 amperes would not augment the temperature to any appreciable extent. With a coat offering the resistance mentioned, it was possible, but only for a few instants, to send through the coat a current of 1,000 amperes, without any danger. How is the protective action of this peculiar garment to be explained? Two theories can be offered.

The electrical coat of mail may be compared with a Franklin cage, the interior of which, containing the body, cannot be penetrated by any electrostatic charge. By virtue of the law of derived currents, and as a consequence of this law, the second theory holds that the current will pass almost entirely through the metallic links, a negligible part passing through the human body, of which the resistance is very high, compared with that of the garment. In other words, the current follows the path of least resistance.

The Current Supplement.

The current SUPPLEMENT, No. 1428, presents the second and concluding installment of Mr. Day Allen Willey's admirably illustrated account of the Krupp Works at Essen. J. T. Milton and W. J. Larke tell something of the decay of metals. F. Giesel, whose experimental work with radium has attracted the attention of scientists the world over, writes on the "emanation substance" from pitchblende, and on radium. The Serpollet steam automobile is to be fully described, and its parts illustrated in detail, in the columns of the SUPPLEMENT. The first installment of the article on the automobile appears in the current issue. Lieut.-Col. H. A. Yorke's report of his visit to America is concluded. Camille Mercader has devised a method of hydraulically manufacturing hollow axles. An article from his own pen on the subject should be of interest. Excellent illustrations accompany the text. An investigation of a garbage crematory is the subject of a report made by Rudolph Hering to the Special Committee on Crematory of the City Council of Trenton, N. J. The report is valuable for the practical information which it contains. An abstract of the code of Khammurabi, an ancient king who seems to have given civilized mankind its laws, is also published in the SUPPLEMENT for the benefit of our archæological readers. The Crompton potentiometer for electrical measurements with direct current supply describes a means of measuring the electrical current directly from the supply. "How Land Yachts Are Made from Old Bicycles" is the title of a practical article of no little value. Sir Oliver Lodge recently read a paper before the Institution of Electrical Engineers, in which he outlined his theory of electrons; the paper is to be published in full in the SUPPLEMENT. In the current SUPPLEMENT the first installment of the paper will be found.

How to Get Rid of Rats.

All tradesmen, being liable to the incursions and depredations of rats, it may not be out of place to mention a method of getting rid of these pests which is recommended by a correspondent of the Birmingham Daily Post. This consists in thinning down with petroleum ordinary slow-drying tar-varnish such as bedstead makers and japanners use and pouring the mixture into the runs of the rats. The vermin are said to loathe the smell of the stuff, and will do anything to get clear of it. A still more effective plan is said to be to catch a rat alive, dip it up to the neck in the varnish and turn it loose. Its fellows will flee from it as from the de'il. The dipping process is said to be harmless to the rat. But some ironmongers may not care to "dip a live rat up to its neck."

A Record Issue of the Patent Office Gazette.

The Patent Office Gazette, which issued on May 5, is the largest ever published. On May 5 828 patents were granted. The best previous record was that of April 29, 1902, when 764 patents were issued.