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To cite this article: J.J. Hemmer (1799) I. Observations on animal electricity, and particularly that called Spontaneous , Philosophical Magazine Series 1, 5:17, 1-7, DOI: [10.1080/14786449908677105](https://doi.org/10.1080/14786449908677105)

To link to this article: <http://dx.doi.org/10.1080/14786449908677105>

Published online: 18 May 2009.

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THE
PHILOSOPHICAL MAGAZINE.

OCTOBER 1799.

I. Observations on Animal Electricity, and particularly that called Spontaneous. By J. J. HEMMER.*

UNDER Animal Electricity I understand that kind observed in animals, from whatever cause it may arise. When this electricity is excited in animals, neither by the peculiar movement of their own bodies, nor by friction, or the application of any other body, it is called Spontaneous Animal Electricity. We are taught by many instances, both ancient and modern, that men, as well as other animals, have exhibited evident signs of electricity; although the ancients, who mention these instances, did not know to what the phenomenon was to be ascribed. It may not be improper, therefore, to quote here some of the most remarkable of them.

I. We are told by Virgil, that the hair of Afcenius emitted a harmless kind of flame †.

Ecce levis fummo de vertice visus Iuli
Fundere lumen apex, tactuque innoxia molli
Lambere flamma comas, et circum tempora pasci.
Nos pavidi trepidare metu, crinemque flagrantem
Excutere, et sanctos restinguere fontibus ignes.

* From the *Transactions of the Electoral Academy of Sciences at Mannheim*, Vol. VI.

† *Æneid*, Lib. II. v. 582.

II. We are informed by Dionysius and other writers, that fire streamed forth from the hair of Servius Tullius, the Roman king, during sleep, when he was about seven years of age*.

III. Pliny also speaks of light often shining around the heads of men:—*Hominum quoque capita vespertinis horis stellæ magno præfagio circumfulgent* †.

IV. We are told of a Carmelite monk, who was always attended with this phenomenon, that, as oft as he stroked his hair backwards, it emitted sparks ‡.

V. A woman at Caumont exhibited a phenomenon of the like kind, as her hair, when combed in the dark, always emitted fire §.

VI. Father J. Faber speaks of a young woman from whose head sparks of fire always fell when she combed her hair ||.

VII. Franciscus Guidus produced bright flames from his body when he rubbed his arm with his hand as he lay in bed ¶.

VIII. Ezekiel de Castro **, a physician of Verona, relates the following circumstance respecting Cassandra Buri, a lady of the same place:—As often as she touched her body, even in a slight manner, with a linen cloth, it emitted sparks in great abundance, which could be perceived by every person standing near her, and which were attended with a considerable noise. Her maids were often deceived by this phenomenon, and believed that they had, through carelessness, dropped some coals between the sheets, as she always caused her bed to be warmed in winter, at which time the sparks were most abundant and strongest.

IX. Anthony Cianfi, a bookseller at Pisa, when he pulled off a narrow shirt, and a piece of cloth which he wore on his breast, emitted sparks from his back and arms, with a crack-

* Antiq. Rom. Lib. IV.

† Hist. Nat. Lib. II. cap. xxxvii.

‡ Cardanus, Lib. VIII. de rerum variet. cap. xliii.

§ Scaliger. Exer. 174.

|| In his *Palladium Chymicum*.

¶ Bartholinus de luce animalium, *Lugd. Bat.* 1647, p. 121.

** In his book *De igne lambente*.

ling noise, to the great terror of his whole family. Fortunius Licetus was a witness of this phenomenon *.

X. "Among us," says Gefner, "where heated chambers are usual, it often happens that many persons, when they have warmed themselves at a stove, and then pull off their shirt in a cold bed-chamber, or move or shake it after it is pulled off, observe crackling flames to burst from it †."

XI. Bartholinus says, that a rope-dancer at Turin, according to the testimony of a respectable man, Cassiano a Puteo, emitted a like phenomenon of light from his body ‡.

XII. The same author says, that sparks proceed from the skins of cats, and particularly from the back; which can be clearly perceived by stroking the hair backwards even with the least pressure, and especially after they have been warmed at the fire §.

XIII. Scaliger speaks of a white Calabrian horse, which, when combed in the dark, emitted sparks of fire ||.

XIV. Ezekiel de Castro says ¶, of another horse of the same kind, that real sparks were observed when his neck was stroked upwards with the hand or a currycomb.

XV. Simpson treats of the light emitted by the bodies of animals when rubbed; and quotes instances of such phenomena on combing the hair of a woman, currying a horse, and stroking a cat with the hand **.

XVI. The following circumstance respecting himself was told by Vaudania to the celebrated Beccaria:—"For ten or twelve days past, since the cold set in, I wear, between two shirts, a piece of beaver's skin. Always when I pull off my upper shirt at night, I observe that it adheres, in some degree, to the piece of skin; and when I draw my shirt from it, I see sparks which have a striking resemblance to those of electricity. Scarcely do I begin to pull off the piece of skin

* Licetus de causis monstrorum, Lib. II. cap. xxviii.

† Lib. de lunariis.

‡ De luce animali, p. 123.

§ Ibid. p. 189.

|| Exercitat. 174.

¶ Liber de igne lamb.

** Diff. Phys. de fermentatione, 1675.

when I find that it adheres, and with still greater force, to the under-shirt. On taking it out I observe, when I hold it in the right hand, that the frill of my shirt moves up from my body towards it. If I remove the piece of skin to a greater distance, and draw it from the frill, the latter moves again towards my body. If I bring the piece of skin nearer, the shirt moves again towards it. This oscillation of my shirt between my body and the piece of skin continues alternately, till it is gradually lessened, and at length ceases."

XVII. About twelve years ago the following circumstance was communicated to our Academy, in writing, from Berdigheim:—On the 12th of February a young woman having put on an aired shift, which was exceedingly narrow and sat very close to her body; heard, on laying hold of it, a crackling noise like what oftentimes proceeds from the flame of a candle, and observed sparks to issue from all those places which she touched with her hands. Being astonished at this phenomenon, she called to another girl, who slept in the next apartment, to come to her assistance, as her shift, which she in the mean time pulled off, was on fire. They both now shook the shift in order to extinguish the sparks; but the more they moved it, the effects were stronger: on examining the shift, however, no traces of fire could be discovered. The first maid then put on another shift, which she took from her box; but as soon as she touched it, the same crackling noise and appearance of sparks took place. She then put on her dirty smock, which she had before pulled off, and returned to bed, on which the phenomenon disappeared. Some persons to whom the circumstance was afterwards related, were desirous to know whether the same phenomena would again appear if the maid put on another clean shift. She did so the following night; and as often as the smock was touched by her or any other person, a crackling noise was heard, and sparks were emitted every time the finger was brought near it. The spectators now desired her to put on another clean smock, which belonged to another maid: on approaching the hand a like noise was heard, and the appearance of fire was observed; but no sparks issued from her body, even though touched, when she had the shift on.

An

An experiment was then made to try whether the same phenomena would occur if another woman put on the girl's shift; but nothing of the kind was observed either by the person who had put it on, or by those who touched it; but the phenomena were repeated when it touched the maid on whom they had been first observed. Every time after this period that the same person put on a clean smock, the same effects were produced; but they disappeared after the shift had been worn some days. On the 1st of February the whole phenomenon ceased, and after that time never returned.

XVIII. M. Flad junior, member of our Society, having been in a consumptive state about eight years ago, observed, for a long time, as often as he pulled off or drew on his stockings, that sparks proceeded from his feet in abundance. Having afterwards recovered his strength in some measure, the sparks disappeared; but they returned when his strength again began to decrease, and continued till his disorder put an end to his existence.

XIX. As often as M. Hertel, chaplain to the Elector, draws his hand over his breast, which is covered with hair, abundance of sparks are seen in the dark.

XX. I was told by Count von Kagenek, that it often happened to him, that when he drew a silk handkerchief between his fingers, while standing near a stove, long luminous stripes were here and there observed.

XXI. I was told also by a lady named Von Fraïse, that very often, when she rubbed her hands or arms even weakly with a linen cloth, lying in bed, abundance of sparks issued from them.

XXII. M. Von Schlemmer, of Deux-Ponts, relates of a lady named Von Koch, that she often observes, when she gets up early, that a ribbon, with which she binds up her hair during the night, adheres to her fingers when she pulls it off, and moves with velocity towards other neighbouring bodies. Having, by my desire, applied to the ribbon a piece of sealing wax, which had been rubbed, it was always repelled by it.

XXIII. I am acquainted with another lady, whose hair,
when

when combed in the dark, always has a luminous appearance, as I have sometimes observed myself.

XXIV. I have a white horse, from the body of which, particularly in the winter-time, the comb brings forth abundance of sparks. I have likewise a white dog, from the back of which, when I draw my hand over it, in a warm room, from the tail to the head, sparks issue with a snapping noise, and which seem so troublesome to the animal, that he endeavours to run away. I have sometimes charged a jar with them.

XXV. I have often produced the same phenomenon on an ash-grey, strong, lively cat.

XXVI. We are acquainted with three kinds of fish which, when touched, give a shock almost like that occasioned by a charged jar, *viz.* the cramp-ray, *Raia torpedo* L.; the electrical eel, *Gymnotus electricus* L.; and the *Silurus electricus* L. The more modern philosophers have convinced themselves, by repeated experiments, that the effects of the shock given by these animals are of an electric nature, though to me it appears probable that they depend, in part, on another cause.

The animal electricity which I have announced in these numerous instances is of the coarser kind, and may be easily observed by every one; but there is another kind, of a more delicate nature, which does not spontaneously manifest itself, but must be concentrated and called forth by art. This finer electricity I find first mentioned in a letter of M. de Saussure to the editor of the *Journal de Physique* at Paris. The experiments which this celebrated philosopher made, partly on himself and partly on others, by means of Volta's electrometer and condenser, are given there only in extracts; but the consequences he deduces from them are as follows:

In order to produce this electricity, bodily motion is necessary. The electricity thence produced arises from the friction of the body against the clothes; for as often as he made the experiment naked, he found no electricity. In order that electricity may be produced by the friction of the body against the clothes, the latter must possess the natural warmth of the body; for when he had on clothes that were cold, he could never perceive the least trace of electricity: no electricity

tricity appears also when the body is in a state of perspiration. There are persons who, in this manner, never emit electricity. The electricity which shews itself in the human body is positive, and sometimes negative. The cause of this variation he was not able to discover.

[To be concluded in next Number.]

II. *On the Method of Distilling as practised by the Natives at Chatra in Ramgur, and other Parts of India.* By ARCHIBALD KEIR, Esq.*

THE body of the still they use is a common, large, unglazed, earthen water-jar, nearly globular, of about twenty-five inches diameter at the widest part of it, and twenty-two inches deep to the neck, which neck rises two inches more, and is eleven inches wide in the opening. Such, at least, was the size of the one I measured; which they filled about a half with fomented Mâhwah flowers, that swam in the liquor to be distilled.

The jar they placed in a furnace, not the most artificial, though seemingly not ill adapted to give a great heat with but very little fuel. This they made by digging a round hole in the ground, about twenty inches wide, and full three feet deep; cutting an opening in the front, sloping down to the bottom, on the sides perpendicular, of about nine inches wide and fifteen long, reckoning from the circle where the jar was to come, to serve to throw in the wood at, and for a passage to the air. On the side too they cut another small opening of about four inches by three; the jar, when placed, forming one side of it, to serve as a chimney for the smoke to go out at. The bottom of the earth was rounded up like a cup. Having then placed the jar in this, as far as it would go down, they covered it above, all round, with clay, except at the two openings, till within about a fifth of its height; when their furnace was completed.

In this way I reckon there was a full third of the surface

* From the *Asiatic Researches*.