SCIENCE.—SUPPLEMENT.

FRIDAY, MARCH 25, 1887.

SCIENTIFIC PHRENOLOGY.

UNDER the above title the London *Times* reports an interesting session of the Anthropological institute, Mr. Francis Galton in the chair, at which Professor Ferrier read a paper on the 'Functional topography of the brain.' He discussed the question how far recent investigations into the functional topography of the brain could be brought into relation with craniological and anthropological researches with a view to establish the foundations of a scientific phrenology. Then he sketched the functional topography of the brain so far as it had been settled, but pointed out that the psychological aspects of brain-functions were still far from being made out, although that correlation must be established and proved before a practical psychology, in any degree serviceable to the physician or the anthropolo ist, could be regarded as possible. He offered some speculations on the subject, and illustrated them by reference to certain facts and phenomena of disease in man. On the question as to how far it was possible, from an anatomical examination of the brain, to form an estimate of the forces and capacities of the individual, he pointed out many great difficulties which had to be encountered. Not merely the size of parts had to be taken into account, but the relation of different regions to each other, the action of *metastasis*, structural differences, as well as other influences. *Caeteris paribus*, greater anatomical development might be considered as an index of greater functional capacity, all which points the lecturer illustrated in various ways. He thought the attempt to determine differences in functional capacity from the examination of the head involved all the difficulties connected with the examination of the brain, and a great many more. He indicated the cranial relations of the principal convolutions, but expressed his belief that in the present state of our knowledge the data of a scientific phrenology were still very deficient. There was reason to believe, however, that if the subject were taken up from different points of view by anatomists, physiologists, psychologists, and anthropologists, great progress might be made.

The discussion of the paper was opened by Sir James Crichton Browne, who detailed some very interesting electrical experiments he had made on the brain of a monkey, which clearly demonstrated localization of the cerebral functions. There were too often, however, insuperable difficulties to be met with in pursuing a parallel series of experiments on the living human brain. There were on record some curious accounts of investigations relative to the brain of a fowl by a bishop of Ratisbon in the thirteenth century, and in 'Burton's anatomy of melancholy' a good number of instances more or less like it were collected. It seemed to have been agreed that the number of the cerebral functions was thirty-five. To the early phrenologists a certain tribute of praise was due for their having, at least, called attention to the subject of craniological phenomena, although the quackeries of Professor Cagliostro and his rivals were simply beneath contempt. Boys were artfully trained to subserve the cunning exhibitions of such impostors. Still it must be allowed that the pseudo-phrenology in a certain sense paved the way for the cautious researches of the true science of a possibly distant future.

PSYCHOLOGICAL NOTES.

THE January issue of *Mind* contains an account of an interesting series of experiments on the limit of the capacity to repeat a series of sounds after hearing them read once. A German experimenter, Ebbinghaus, had studied the powers of the memory by counting the number of times a given series of nonsense-syllables had to be repeated in order to enable the hearer to reproduce them by rote. Mr. Joseph Jacobs (with the cooperation of Mr. Sully, Mr. Read, and Mrs. Bryant) has carried a similar means of testing the memory (or, as they more accurately call it, the 'prehension') into the school-room. The method was somewhat simpler. Instead of nonsense-syllables (for instance, *dak-mil-tak-bin-roz*), which are very disturbing, the names of the letters (omitting 'double *u*') and of the numerals (omitting 7) were chosen; and the maximum number of letters and numbers that a child could repeat after *one* reading was called its 'span.' Care was taken to pronounce the words as monotonously and as regularly as possible in order to avoid any assistance to the memory from a more or less decided rhythm. The numbers or letters were dictated to the class, each member of which then (usually) wrote down as accurately as possible the series of letters or numbers. The results thus reached were quite interesting.

The mental span increases quite constantly with the age. Boys of 11 years could grasp 6.5 numerals and 5.5 letters; of 12 years, 6.8 numerals and 5.7 letters; of 13 years, 8.8 numerals and 6.9 letters. The following table shows the result of a more extended set of observations on the girls of the North London collegiate school: —

Age	8	9	10	11	12	13	14	15	16	17	18	19
Number of subjects	8	13	19	36	41	42	42	72	66	50	30	14
Average number of numerals	6.6	6.7	6.8	7.2	7.4	7.3	7.3	7.7	8	8	8.6	8.6
Average number of letters	6	7	6 6	6.4	6.5	6.7	6.7	7.4	7.9	7.3	8.2	7.9

While the limit for numerals was, as a rule, higher than that for letters, cases when the reverse was true were not infrequent. In one set of 88 schoolboys, 14 could repeat more letters than numerals, while 33 of the remainder had the same limit for both. No definite conclusions can be drawn as to the relative spans of the two sexes, as the boys and girls came from different classes of society. It may be worth noting, that, at the age of 13, the boys could repeat 8.8 numerals to the girls' 8.3, but only 6.9 letters to the latter's 7.3.

A very clear result was, that the span bore a definite relation to the rank in the class. Thus, the 10 boys who stood highest among 30 twelve-year-olds had an average span for numerals of 9.1; while the middle 10 had only 8.3, and the lowest 10, 7.9; and the same holds for the girls. The first half of a class almost invariably shows a higher span, both for letters and for numerals, than the second half.

Mr. Francis Galton and Professor Bain applied a similar method of observation to the memory-powers of idiots. While most idiots can hardly add two figures together, some have a decided knack for remembering figures, dates, and so on. Nine of the best girl-idiots at an asylum (none of whom could add 3 to 5) had an average span for numerals of only 4. Two girls who could not repeat more than two figures without mistake were tested with three figures. In 23 trials the last figure was rightly repeated 17 times, the second 10 times, and the first 7 times, showing that the last-uttered sound is most readily repeated.

Idiots with peculiar memories were also tested. One could repeat pages of Maynall's 'History' with considerable exactness; another had a remarkable intimacy with the calendar. But they all failed on the numeral test, being hardly able to repeat three figures. Their memories seemed deeply rutted in one groove; not strong, but very limited.

The experiments on the idiots of another asylum showed a somewhat higher mental span, accompanied by a higher capacity generally.

In the same journal, Dr. J. M. Cattell records some 'Experiments on the association of ideas. His object is to measure the time needed for the characteristic processes of ordinary thinking. The experiments were made on himself and a German friend, Dr. Berger. A few of his results are these. To give the name of the picture of an object in a foreign language (English for a German, and German for an American) required .649 and .694 of a second respectively, which is .172 and .149 of a second longer than to name objects in one's own language.

Experiments on the time necessary for translating words showed that it took longer to translate from the foreign to the vernacular than the reverse, and also that the time itself might indicate one's familiarity with the two languages.

Given a city to name the country in which it is situated required about .400 of a second. Given a month to name the following month required .367 of a second, while to name the preceding month took as long as .798 of a second, showing how much more readily the mind moved forwards than backwards. Similarly, it is easier to proceed from the part to the whole than from the whole to the part. Given a month to name the appropriate season requires .363 of a second; given a season to name a month in it, .498 of a second.

When the association is less restricted, — as, for instance, to name a subject for an intransitive verb (*swim – fish*), or an object for a transitive one (*write – letter*), — the time is longer. The former operation took .646 of a second, and the latter .517, the mind moving logically towards the object.

The time necessary to judge the length of a line suddenly revealed was very long (nearly one second), showing that the judging process forms slowly.

It is, however, to be remembered that in all the above processes individual variations are extremely large. While such experiments are rather suggestive and personally interesting, they can hardly be said to have the scientific character or importance belonging to the measurement of more elementary processes. There is little guaranty that the process in different minds is sufficiently alike to make an average significant.