solar heat. 5°. Observations during a lunar eclipse. 6°. Formation of a lunar heat spectrum.

We can only summarize the results, and they are best given in his own words: "While we have found abundant evidence of heat from the moon, every method we have tried, or that has been tried by others, for determining the character of this heat, appears to us inconclusive; and, without questioning that the moon radiates heat earthward from its soil, we have not yet found any experimental means of discriminating with such certainty between this and the reflected heat that it is not open to misinterpretation. Whether we do so or not in the future will probably depend on our ability to measure by some process which will inform us directly of the wave-lengths of the heat observed."

Were this all, it would be a somewhat discouraging ending, but the best and most important part is a note added February, 1885, which we quote in full:—

"Since the above paragraph was written, we have succeeded in obtaining measures with rock-salt prisms and lenses in a lunar heat spectrum. These difficult measures must be repeated at many lunations before complete results can be obtained; but, considering their importance to the present subject, we think it best to state now in general terms, and with the reserve due to the necessity of future experiment, that they indicate two maxima in the heat curve,—one corresponding within the limits of errors of observation to the solar curve maximum; the second, indefinitely lower down in the spectrum, corresponding to a greater amount of heat at a lower temperature. Exactly what temperature this latter corresponds to, we have no present means of knowing. We have succeeded, however, in forming a measurable heat spectrum from the surface of a Leslie cube containing boiling water, and the maximum ordinate in the lunar heat curve appears to be below the maximum ordinate in the hot water curve. The inference from this is, of course, that the temperature of the lunar soil is, at any rate, below that of boiling water, and in an indefinite degree.

"We cannot close this note without calling attention to the remarkable fact that we here seem to have radiations from the moon of lower wave-length than from the sun, which implies an apparent contradiction to the almost universally accepted belief that the sun's emanations, like those from any heated solid body, include all low wave-lengths representing temperatures inferior to those certainly emitted."

Further comment is unnecessary. The novelty and importance of the above is self-evident.

H. M. PAUL.

ILLUSTRATIONS OF RECENT ITALIAN PSYCHOLOGY.

THE science of psychology is still somewhat in the position of the young man who has just passed his twenty-first birthday. While really entitled to all the rights and dignities belonging to any of the citizens of the republic of science, yet these privileges are accorded with somewhat of a reluctant spirit especially on the part of the older citizens, who seem rather startled at the notion of receiving, on terms of equality, so very youthful and so very presumptuous a candidate. But now that special professorships in this department have been instituted at several of our universities and colleges; now that the questions which it discusses find a hearing before appropriate sections of the great scientific associations (for it is scientific psychology alone that is meant); that special societies and journals are devoted to the encouragement of its progress; it may fairly be presumed that whatever of a protest to this reception still makes itself heard is only the echo of by-gone days.

While the greatest part of our experimental knowledge of mind is undoubtedly due to German writers and workers, France and Italy have also contributed much to raise the science to its present position. In France the *Revue philosophique*, of which M. Ribot, whose psychological works are well known to English readers, is the editor, pays special attention to the strictly scientific side of its domain. There has been founded, too, a society of physiological psychology, especially devoted to the consideration of experimental topics. In Italy the *Rivista sperimentale di freniatria*, edited by M. A. Tamburini, and the *Archivio di psichiatria*, etc., edited by M. Cæsare Lombroso, devote much of their energies to another side of the subject. Both the writers just mentioned are deeply interested in the psychology of the criminal and other classes of defectives. The voluminous work of M. Lombroso (Uomo delinquente) is a standard in this line of research. The *Revue philosophique* for September enlarges the circle of readers of some of these researches, by presenting a summary of articles from the two Italian journals. In the hope of still further increasing the usefulness of these contributions to psychology, some account of them is given here.

M. Ferri has made a special study of the religious sentiment in the criminal class, and intends to publish a volume on this subject. He found, in a very large number of criminals examined, only a single one who did not believe in the existence of a God, and most of them belonged to the established church. Many of them are de-

voted to religion, tattooing themselves with religious symbols, asking for God's aid in their enterprises, and thoroughly sincere in their belief that confession absolves them from all responsibility. They are very superstitious; several were found who believed that they expiated their crime by dipping their fingers in the blood of the victim and sucking them, or by wearing the same shirt for a year.

A very excellent example of the connection between the various forms of mental and moral imbecility is shown in the case of a certain Salvatore Misdea, a soldier, whose crime was one of a peculiarly savage nature. He had a prejudice against all Italians who did not come from his own province of Calabria, and imagined that a certain officer had selected his fellow-countryman for punishment just because the latter was a Calabrian. He attacks the corporal, but another soldier, Cordara, interferes. He threatens to chop Cordara's head off that night, but soon everything is calm again. Suddenly a shot is heard and a soldier falls. Misdea enters with a gun, and fires into the crowd right and left. Many try to escape, but he pursues them, and kills the corporal and five or six other soldiers before the gun is wrested from his hands. In prison he was carefully examined by M. Lombroso and Bianchi. They find him to be a crafty, suspicious fellow, with a good deal of pride in his criminal powers. His head was deformed and asymmetrical; the forehead low and poorly shaped, narrow in the temporal region and large above. The right half of the head is more developed than the left; the reverse being the normal condition. Besides, he has epileptic tendencies. His family presents a line of abnormal persons, whose abnormality shows itself in insanity, idiocy, criminality, and general looseness of character. (1.) His grandfather was weak-minded. (2.) Of four uncles, two were imbeciles, a third eccentric, and a fourth killed a friend in a broil; while Misdea's father wasted a fortune on drink, women, and gambling, and his mother was an hysterical woman, who had one brother a brigand and another a sneak-thief. (3.) Of four cousins, two were imbeciles, a third idiotic, and the other insane. (4.) Of four brothers, one was healthy; two were drunkards, one at the same time epileptic; and the other was a violent character. (5.) A nephew also showed bad traits. In spite of all the evidence pointing to his irresponsibility he was condemned to be shot.

This case strongly reminds one of the celebrated criminal family of the 'Jukes' in New York state. There, too, the members of this monstrous family were not all afflicted with the same kind of disease, but weak-mindedness, pauperism, obscenity, thievishness, and burglarism showed themselves in different branches of the family. This inter-relation of moral and mental insanity, especially in their hereditary forms, has recently been attracting much attention. Dr. Maudsley has noted the great prevalence of moral failings in epileptics and imbeciles. Kraft-Ebbing, a German alienist, corroborates these observations; and M. Lombroso has now attempted to describe some bodily peculiarities common to many of these defective classes. He finds that in moral insanity as in epilepsy the stature and weight are often 13 per cent superior to the normal mean. There is generally, too, an asymmetry of the cranium and other parts. So, too, in face characteristics, epileptics show certain peculiarities which are also found in persons defective from birth. The ears are rounded, the cheek-bones prominent, the forehead wrinkled, the beard wanting, the jawbones exaggerated, the face asymmetrical, the forehead low and with a hunted expression among the men. Most of these characteristics are evident in the women as well, who frequently have a masculine expression. Obtuse sensibility and eye troubles are common among them. But the chief points of contact will always be their psychology, and for this one must consult the larger works of Lombroso and others.

The study of the bodily or anthropometric peculiarities of these defective classes is getting to be a very favorite line of work. Quite an original contribution to this subject is the attempt of Messrs. Lombroso and Cougnet to detect the effect of different states of the emotion on the pulse beat. They took the tracing of the sphygmograph in sad and gay moods. They excited the amorous passion, or showed a piece of gold, or a glass of wine, or paid the person a high compliment. The sexual passion and the glass of wine modified the course of the pulse, the money did so still more, and vanity the most. In short, criminals are a very vain class of beings.

The question of bodily asymmetry has been frequently referred to, and is generally recognized as an important symptom not only in the head measurement, but also in all the properties common to the two sides of the body. M. Lombroso has recently measured the local sensibility[1] of the skin on the two sides of the body in the sane, insane, blind, and deaf mutes. In normal persons the sensibility on the right side is 6 per cent better than on the left. In 100 persons there is an equal sensibility on the two sides in 44; left

[1] This was done in the usual manner. A pair of compass points are applied to a definite region and moved so far apart until the subject can just discriminate that two points are applied (and not one).

superior, 26; right superior, 29. In criminals, however, the left side is 11 per cent more sensitive than the right; and their sensibility is only 83 per cent of the normal; *i. e.* their sensibility is more obtuse, and the normal relations on the two sides are reversed. In 100 criminals the sensibility is equal bi-laterally in 54; left superior in 27; right superior, 18. One hundred and four insane patients were examined, 43 per cent of whom were more sensitive on the right, 33 per cent on the left side, and 24 per cent were equally sensitive on the two sides. As left-sidedness of this kind becomes more frequent, the difference between the two sides of the body becomes greater. This phenomenon the author calls 'laterality,' and recognizes as a true pathological symptom. In the blind, as in normal people, the right side is the more sensitive, and is as much as 13.5 per cent superior to the left. But their absolute sensibility is 96 per cent of the normal,[1] *i.e.*, slightly less than that of seeing persons. The male blind are more sensitive on the left side, the females on the right. Their 'laterality' and prevalence of left-sidedness allies them to abnormal classes. In deaf mutes the left sensibility is 15.5 per cent better than the right, and their absolute sensibility is like that of the blind, 4 per cent inferior to the normal. Left-sidedness, too, is prevalent.

J. J.

COMPOSITION OF THE WHEAT GRAIN.

THE various grades of wheat flour differ from each other, chiefly as regards the admixture of the outer coats of the grain and of the germ found in the pulverized endosperm which constitutes the bulk of the flour. The problem which M. Girard in his recent book[2] proposed to himself was to separate the grain, not into flour and bran, but into the several tissues of which the microscope shows it to be composed, to determine the proportion of each contained in the grain, to analyze each, and, finally, to determine from these and other data the alimentary value of each tissue and the advisability of allowing it to enter into the finished flour. By very ingenious methods, and the expenditure of much time and patience, he was able to separate, first, the coats of the grain from the endosperm, and, second, the several tissues of the seed coats from each other. The results of this laborious investigation are very interesting, and enable us to form a much more accurate notion of the quantitative distribution of nitrogenous matters, ash, woody fibre and fat among these tissues than was possible before. At the same time it cannot be said that, aside from this, they constitute any very material addition to our knowledge. They show that the 'aleurone layer' is rich in nitrogenous matters, and contains very nearly all of the nutritive substances found in the seed coats, but this was well enough known before.

Of more general interest are his investigations of the nutritive value of the several seed coats, and of their influence upon the quality of bread; but here, unfortunately, a prejudice becomes apparent which detracts seriously from the value of the investigations. The author entitles this section of his book 'Experiments upon the *non-digestibility* by man of the envelope of the wheat grain' (the italics are ours), and he allows this prepossession to lead him into some serious errors in interpreting his results. His digestion experiment (but one was made) was executed upon himself, and, according to his interpretation, showed that but an insignificant proportion of the total dry matter or of the proteine of the envelope was digested. Before the experiment, however, he extracted his materials with water. The amount of matter thus extracted is stated, but it is not counted as digestible, as it evidently should be, because, as the author himself says, "it is evident that they (the extracted matters) would be dissolved in the digestive apparatus."

Correcting this error, and also a gross error in the method of calculation employed for the proteine, we find that there was really digested 22.8 per cent of the dry matter and 35 per cent of the proteine of the envelope, or that it contained 22.8 per cent of total digestible matter, including 6.5 per cent of digestible proteine. Girard's figures are 6.77 per cent of total digestible matter and 0.73 per cent of digestible proteine!

Rubner, in some recent investigations[1] obtained still higher figures, viz., 31.3 per cent of the dry matter, 61.1 per cent of the proteine, and 26.6 per cent of the non-nitrogenous matters; but his figures were obtained by a rather complicated calculation, and refer rather to commercial bran than to the clean seed coats of Girard's experiments. There is no sort of doubt that a not inconsiderable proportion of the seed coats is digestible by man, but, as Girard emphasizes, when calculated upon the whole grain the proportion thus utilized is small, while the quality of the bread is impaired. This is particularly the case with raised bread. According to Mège-Mouriès

[1] This conclusion is contrary to the prevailing opinion. Moreover, the careful experiments of Czermak on blind boys showed very clearly that their sensibility was better than that of seeing persons. It should also be noted that the left side is frequently referred to as the more sensitive.

[2] *Composition chimique et valeur alimentaire des diverses parties du grain de froment.* Par M. AIMÉ GIRARD. Paris, *Gauthier-Villars*, 1884. 67 p., 3 pl. 8°.

[1] Jahresbericht über thier-chemie, xiii. 384.