

The advance in knowledge since the fifth edition of the "Gewebelehre" is nowhere so striking as in the case of the central nervous system. The extended study of degeneration following upon injury, and the histological methods introduced by Erlich, Golgi, and others, have led to a rapid increase in knowledge concerning the distribution of nerve fibres both within the central nervous system and outside its limits; while an altogether new conception of the anatomical relations of ganglion cells has been established. Prof. von Kölliker was one of the first to recognise the importance of Golgi's work; and after visiting him in Padua in 1887, he adopted the new method in a series of investigations, some of which are described in seven papers published between 1889 and 1891 (cf. especially *Zeitschr. f. w. Zoologie*, vols. xlix. and li.), while the results of others appear for the first time in the second volume of the "Gewebelehre." This volume, of nearly 900 closely-printed pages, illustrated by 840 figures, most of which are as usual original, attempts nothing less than an outline of the comparative histology of the central nervous system in Vertebrata generally. The value of this enormous work arises not only from the new statements of fact which it contains, but from the systematic treatment of the mass of detail, constituting almost a new science, by a man who knows every fact referred to from his own observation.

This is not the place in which to speak of the numerous and well-merited honours conferred upon Prof. von Kölliker by the Government of his own country and by scientific societies and academies in almost every land. It is hoped that the foregoing imperfect outline of his work may give some idea of his position as one of the founders of modern systematic histology, and of his valuable services to embryology and comparative anatomy. Those who are best able to judge the imperfections of this sketch will be best able to understand the magnitude of the attempted task.

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#### NITRO-EXPLOSIVES.

*Explosifs Nitrés.* By J. Daniel. Pp. viii + 235. (Paris: Gauthier-Villars et Fils.)

BY far the greater portion of this book is a fairly literal translation of Mr. Sanford's work on nitro-explosives, published in 1894. It suffers therefore, in many respects, from the same defects, though in others it is a decided improvement. Like the original it gives, for example, a description of all the gelatinised nitroglycerine preparations before giving the manufacture of the various nitro-cottons used in gelatinising them, which is, in several respects, an inconvenient arrangement. Like Sanford's work, it describes the manufacture of nitroglycerine and nitrocellulose in greater detail than is necessary for the use of a general chemist, and yet insufficiently so to serve as a complete guide to the manufacturer. The description of nitroglycerine is, however, a marked improvement on the original, and does not, for example, leave the reader in doubt as to whether nitroglycerine should be regarded as a nitric ether or not. It is, therefore, all the more surprising to find that M. Daniel, like Mr. Sanford, has apparently

failed to grasp the great importance, from a theoretical as well as a practical point of view, of the fundamental difference between a nitric ether, on the one hand, and a true nitro-compound on the other. The former, although, when pure, perfectly stable at ordinary temperatures, decompose readily at, comparatively speaking, low temperature, and are one and all unstable at ordinary temperature in the presence of even minute traces of strong mineral acids as well as in the presence of many organic acids. Hence, in order to ensure the stability of a powder containing a nitric ether, it is absolutely essential not only to exclude all free acids, but also all compounds likely to become acid. Hence ammonium salts, like nitrate of ammonium, for example, may be used with perfect safety in admixture with a nitro-compound, such as dinitrobenzole in the manufacture of bellite, roburite, securite, &c., whereas the presence of this salt would be fatal in an explosive containing a nitric ether such as guncotton or nitroglycerine.

The preparation of the various nitro-celluloses, soluble and insoluble, is given very fully—too fully for the general chemist; but the author, in following too closely his original, fails to point out that the question of solubility or non-solubility of nitro-cotton is, in great measure, at least, one of method of manufacture and not one of degree of nitration, and also depends, in a measure, on the temperature of the ether alcohol mixture. This is very remarkable, seeing that the Cordite trial, during the progress of which this question of soluble and insoluble guncotton was very fully discussed, is several times alluded to in the work. The statement, found in both works, that the sulphuric acid in the manufacture of guncotton does not take part in the reaction, is, at least, open to doubt. The manufacture of celluloid, to which eight pages are devoted, however interesting in itself, should scarcely occupy so much space in a work of only 271 pages devoted to nitro-explosives.

A very useful addition of M. Daniel consists in a description of the physiological effects of nitroglycerine and dinitrobenzole. The baneful effects of this latter compound on the health of the workpeople employed in the manufacture of explosives containing it, was first clearly established by a small Departmental Committee of the Home Office, and it is curious to find it taken up by a Frenchman and omitted from the work of an Englishman.

Most of the more commonly used explosives are shortly, but sufficiently described; but the mistakes found in the original unfortunately reappear in the translation. Thus roburite never was a mixture of ammonium nitrate and chlorodinitrobenzole, but one of the former salt with chlorinated dinitrobenzole containing, at most, 2 per cent. of chlorine, a very different thing. This original roburite is no longer manufactured in England. M. Daniel also, like Mr. Sanford, gives what may be called the ideal composition of dynamite (25 per cent. kieselguhr and 75 per cent. nitroglycerine) as the ordinary one, whereas, as a matter of fact, commercial dynamite practically never contains 75 per cent. nitroglycerine, and almost always contains mineral matters besides kieselguhr.

As a further interesting addition by the translator may be mentioned the statement regarding the curious difference in the behaviour of frozen gelatine dynamite and

blasting gelatine respectively, to shock or percussion, gelatine dynamite, when frozen, being, if anything, rather more sensitive to percussion than when unfrozen, while with blasting gelatine the reverse is the case. This is a point of some importance when these two explosives have to be dealt with in winter, and it is curious to note that this fact, like the baneful effects of dinitrobenzole, although first established in England, is not found in the English work, but appears in the French translation.

We must also raise our protest against the statement, repeated in the translation, that blasting gelatine, when ignited in the open, burns but does not explode; this is true only when the blasting gelatine is in relatively small quantities, or in an unfrozen condition. The burning of large quantities of blasting gelatine frequently ends in a violent explosion, and the burning of even a pound or two of the frozen material nearly always leads to explosion. This is one of those careless statements which, unfortunately, frequently lead to accidents.

As regards this portion of the work we should have been grateful to the author if he had given us a little more information as to the various explosives, propulsive as well as disruptive, used in the French army. We in England, foolishly perhaps, have few or no secrets in such matters; it is, in fact, one of the most difficult things imaginable to keep anything secret. In France they manage these things better, or at least differently, and we are still, many years after their introduction, ignorant of the exact nature of the powder and other explosives used by the French army. Any information on these points from M. Daniel would have met with our warmest appreciation.

The chapters on the analysis of explosives are practically a simple translation of Mr. Sanford on the same subject, and suffer from the same defects, and have the same excellencies as the original. Here we can only point out one more instance of want of care in the translator. M. Daniel, like Mr. Sanford, dries moist guncotton at 100° C. to estimate the proportion of water, a proceeding which every one who has tried it must know to be impossible.

One of the greatest, if not the greatest, advances made in the production of smokeless powder, consisting in their complete gelatinisation, whereby they are converted into hard non-porous masses which burn only on the surface, is scarcely hinted at in this work.

Lastly, the list of explosives given at the end of the work suffers from the same defect as did the similar list in Mr. Sanford's book, and several explosives are given, which from the nature of their constituents must be unstable, and therefore dangerous to keep, without a word of warning being added; such as, for example, ammonia dynamite (amidogene) and poudre au nitrate d'ammoniac, which latter contains two salts incompatible with each other, viz. nitrate of ammonium and chlorate of potassium.

In conclusion we welcome this book as a useful addition to our library, but cannot refrain from expressing a hope that Mr. Sanford may soon have an opportunity of giving us a second edition of his work, free from the mistakes and shortcomings of his own first edition as well as those in the French translation of the same.

A. D.

## PSYCHICAL RESEARCH.

*Studies in Psychical Research.* By Frank Podmore, M.A., author of "Apparitions and Thought-Transference." Pp. xi + 458. (London: Kegan Paul, Trench, Trübner, and Co., 1897.)

MR. FRANK PODMORE'S "Studies in Psychical Research" is at once a critically sifted account of facts and the story of a movement. The facts, or alleged facts, concern spiritualism, poltergeists, thought-transference, telepathic hallucinations, ghosts, haunted houses, premonitions, previsions, secondary consciousness, impersonation, obsession, clairvoyance. The movement is the persistent transfer of the facts from the region of myth to the region of verified science. This movement is typified by the work of the Psychical Research Society, which, as Mr. Podmore in his opening chapter shows, was founded by competent persons for the special purpose of ascertaining whether the popular belief in certain phenomena had any basis in scientific evidence. Some ten years ago "Phantasms of the Living" set men thinking on these topics. The theories, as much as the facts there adduced, have stimulated reflection at every hand. Mr. Podmore now aims at placing in a simple form the critical result of twenty years' labour. He is lucid, exact and critical. He pushes no hypothesis except so far as the evidence seems to justify it. Even his favourite "telepathy" is offered as a "working hypothesis" chiefly because it is the smallest "draught upon the unknown."

In Chapter ii., Mr. Podmore gives an account of "spiritualism as a popular movement." The testimony is, he finds, more "copious than cogent." The high-water mark in the scientific observation of spiritualism was Mr. Crookes' experiments with Home and others. The facts narrated in this chapter are subjected to a thorough criticism in Chapter iii. The two chapters are in admirable contrast—the facts of the one melting away under the scrutiny of the other. "Perhaps they heard Dr. Hodgson and the new generation knocking at the door" (p. 81). As the scientific search-light grows stronger, the marvels grow smaller and less numerous. Yet, negative conclusions notwithstanding, the year 1894 witnessed the performances of Eusapia Palladino. In regard to Mr. Crookes and his experiments, Mr. Podmore is becomingly respectful; but the best critical faculty may be taken in by trickery (*e.g.*, p. 111, "Miss Cook, Miss Fay, and other mediums with whom Mr. Crookes experimented"). Mr. Podmore concludes: "Unless and until some feat is performed which fraud cannot explain, the presumption that fraud is the all-sufficient cause remains unshaken" (p. 124). The "unless" and "until" rest with spiritualism, and were it for this result alone, the S.P.R. has not worked in vain. The poltergeists (Chapter v.) are, in brief, demonstrated trickery. In Chapter vi., Madame Blavatsky and her theosophy are, after a narrative that leaves no doubt, dismissed with a *decipiantur*. The grosser theosophy, like the grosser spiritualism, now receives its "unless" and "until." In Chapter vii. ("experimental thought-transference"), however, we are on more solid ground. Much of the material reminds one of Mr. Podmore's former book. He states the cases, and lets the reader "judge for