inhibition of the cell, the current has to pass in the opposite direction, that is from the nerve process, or its collaterals, back to the cell-body. In other words, to produce excitation of a given cell, the current must enter this cell from the surface of its cell-body or of its dendrites; but in order to inhibit or moderate the action of the cell, the nerve current has to enter the cell from its nerve process or collaterals thereof." Diagrams are appended which make this easier to grasp, and he maintains that the connections there portrayed have to a large extent been proven: the objection, that might be made concerning the peripheral ramus of the T-shaped fibre of the spinal ganglion cell, could be met by the results of investigations on invertebrates, which go to show that it is actually not a nerve process, but the homologue of a protoplasmatic process. Thus the fibres, conducting the tonic innervation from the cerebellum upon the motor anterior horn cells, should so end that their arborisations cling to the *protoplasmatic processes* or to the cell-body of the motor anterior horn cells; and the terminations of the cortico-spinal pyramidal fibres come in close contact with those of a *collateral of the nerve process* of the motor anterior horn cell. Onuf would indeed say that the pyramidal fibres have chiefly an inhibitory, moderating action upon the peripheral motor neuron; at any rate the investigations of others, he says, show there probably must be at least one other motor pathway besides the pyramidal tract—thus, he would compare the function of the latter to that of a rheostat in the application of the galvanic current. In testing the knee-jerk, the peripheral motor neuron, then, is acted upon from three directions:—From (*a*) the peripheral sensory nerve fibre, probably through a collateral thereof; (*b*) the cerebellum; and (*c*) the cortico-spinal fibres, which have an inhibitory action and thus counteract (*a*) and (*b*). Assuming this to be true, interruption of the cortico-spinal pyramidal fibres would give rise to exaggerated knee-jerks, by loss of the inhibitory influence; while interruption of the cerebello-spinal motor tract would result in absolute loss of the reflex, because the sensory stimulus coming from the tendon will be entirely counterbalanced by the inhibitory action of the pyramidal fibres.

GERMAN RETROSPECT.

By William W. Ireland, M.D.

The Effect of Poisons on Nerve Cells.—Nissl gave a demonstration of the result of his researches to the meeting of German alienists, held at Heidelberg, 18th September (*Centralblatt für Nervenheilkunde*, October, 1896). He thinks it useless to discuss the question how far the nerve cell which we see under the microscope resembles that in the living organism; but he aims at having a pattern or

typical cell not altered by our treatment. For this purpose the animal should be killed in a particular manner, and the preparation always made in the same way. Then any deviation from the pattern cell must be owing to some other causes. In this way he has studied the changes in the large motor cells of the anterior horn of the spinal cord of the rabbit after administration of strychnine, veratria, arsenic, alcohol, phosphorus, and the toxin of tetanus. He had also studied the motor cells and the cells of Purkinje and those of spinal ganglia of the rabbit after giving lead, the cells in the sympathetic after poisoning by arsenic, and the cells of the cortex of the same animal after poisoning by alcohol, morphia, and lead. He had also studied the cells in the human brain in a case of poisoning by phosphorus and typhus fever. Nissl's method is to give the animal sufficient doses to maintain a toxic effect without ending life. He compares the cell thus acted upon with a healthy cell from the same locality. He has found that after the action of these poisons the effect is not uniform in all the nerve cells; some are more affected than others, while different cells are affected through different poisons. He observes that in some the nuclei are altered, becoming rounder and more homogeneous and take a deeper colour. Dr. Nissl gave twenty-four illustrations of his preparations coloured in his own methods; he also demonstrated the various kinds of nerve cells and pointed out the relation of different species of cells in the nervous centres of vertebrate animals to the different functions. He thought that with the help of a more thorough clinical and psychological analysis we might hope yet to find out the function of different cells in the nerve tissues. He observed that when there are marked alterations in the nuclei, the cells can no longer be restored to their normal functions. Hitzig observed that in tetanus there was found vacuolisation of the nerve cells on dyeing with carmine; but Nissl holds these vacuols to be an artificial product.

Micro-Photography.—Trömner gave to the South-West German Psychological Association at Karlsruhe (*Allgemeine Zeitschrift für Psychiatrie*, lii. Band, 6 Heft) a demonstration of the pathological changes in the nerve cells. He showed the great advantage of micro-photography over the subjective coloured drawings which sometimes illustrate monographs and text books. The photogram is objective, lends itself to no theories, is convenient for measuring, and can be taken in much less time than a drawing. It adapts itself readily to a series of views which show the successive changes in nerve cells under pathological conditions. Trömner showed magnified a hundredfold the appearances in normal and paralytic conditions. He also demonstrated the changes in the nerve cells of the dog after poisoning with alcohol and trional, comparing them with nerve cells in the normal state. The following changes were noted in a dog to whom 120 grammes of alcohol had been administered in two days. Some change of colour in the

spinal ganglia, but no structural change. The motor cells of the anterior horns of the cord and of the nuclei of the cranial nerves admitted of dyeing (by Nissl's method), which they resisted in the normal state. These coloured cells also showed traces of granular degeneration. There were also swelling and degeneration of the cells of Purkinje, and in the pyramids of the medulla there was degeneration of the processes of the nerve cells. In a dog poisoned by trional there were noted similar changes in the spinal ganglia in the motor cells of the anterior horn; the blue colouring brought out five granulations. The processes were less affected than the bodies of the cells. The cells of Purkinje were in part atrophied with granular degeneration, and also vacuolisation here and there.

1. It was found to be common in both these kinds of poisoning that the ganglion cells were scarcely affected in comparison with the motor cells.

2. Cells comparatively healthy were seen lying near cells deeply altered.

3. The degeneration was found in many cases to commence from the foot of the axis cylinder. In poisoning by alcohol the processes, and in trional the nerve cells were more affected.

The After Dinner Sleep.—Dr. Römer (*Centralblatt für Nervenheilkunde*, October, 1896) has observed that after a long sleep the mental activity remains for some time much less than usual. The feeling of weariness is so much the greater the deeper the sleep from which the person has emerged. When the awakened person had fallen asleep early the evening before, and had slept deeply, the inertness was not so great as with those who had fallen asleep slowly and took their rest principally in the morning hours. Römer made similar experiments on the alteration of mental activity in persons who went to sleep after dinner, which the Germans generally take about the middle of the day. He found that the persons experimented on also fell into two categories. Some felt very heavy after dinner, soon fell asleep, slept deeply, and generally awoke of themselves. The others did not feel heavy, were long of falling asleep, required to be awakened, and then showed a considerable diminution of mental activity. This was tested by learning off by heart arithmetical addition and power of selection. An hour was allowed for the siesta. From this it appears that those who generally feel heavy after dinner should not resist the inclination but take a little repose, after which they may expect to be more capable for work.

On the Problem of Unconscious Estimation of Time. By KARL GROOS (*Zeitschrift für Psychologie und Physiologie der Sinnesorgane*, Band ix., Heft 5, u. 6).—Dr. Groos remarks that it is a well known but hitherto unexplained fact that some persons can estimate with surprising exactitude a long duration of time without any external methods of limiting time. This capacity is specially exerted: (1)

In fixing the hour by day and, also, if the person accidentally awakes during the night. (2) When the person awakes to the exact minute intentionally, or at a time fixed by custom. (3) After the post-hypnotic suggestion that he should do something an hour or so after awaking. Dr. Groos quotes the following anecdote regarding the calculation of time in animals. Mr. Thomas Geering stated that a number of geese in a small town in England came regularly every fortnight after the market to pick up the corn spilt on the street. Once, the market day being postponed, they came on the regular day as usual.

In the effort to explain such facts one thinks of all the outer distinguishing marks which could work unnoticed, of the difference in the light, on the peculiar external signs of public and home life to the different times of day, and on the different days of the week. In this way one can easily understand why a cat returns from her wanderings exactly at meal times; why a dog waits for his master at the night hour at his office, or remarks when it is Sunday; why a man awakes at the usual time.

Many little outward marks of time are associated with the act, so that they may serve as unconscious measures of time. However, there are cases where such explanations are insufficient. He quotes Munsterberg, who says, "that probably in calculation of time of long duration the rhythm of our breath plays its part." Dr. Groos quotes the case of a lady who was certain to awake at a given time, if before going to sleep she repeated aloud "one, two, three, four, etc., o'clock I will sleep." If this be correct, we have here an experiment or act along with auto-suggestion, which divides the whole series of time into short rhythmic periods. Dr. Groos mentions a case which seems shut out from all those means of guessing time by outward signs. In the *Gartenlaube* of 1860 there is a story about an orang-outang which had been captured in Sumatra and was kept on board ship during a voyage to Europe. He always slept twelve hours, and his going to rest and awakening were punctual as the clock. As Sumatra lies on the equator, his going to sleep and his awakening were timed by the setting and rising of the sun; but sailing westward and southward the ship lost time. It was noticed that the ape went every day sooner to bed, and as he slept twelve hours he got up so much earlier. When the vessel reached the meridian of the Cape of Good Hope the orang went to sleep about 2 p.m., and rose at 2 o'clock in the morning. We are told that he kept this time as long as he lived (how long this was is not said), although the time differed by two hours, for by correct geographical time the ape should have gone to rest at noon, as the difference of sunset between Sumatra and the Cape of Good Hope is six hours. Thus though the inward valuation of time shown by this ape was not quite exact, still if we consider that all the outward signs of the progress of the day were altered, and the bodily activity of the animal much restrained, it seems

wonderful how nearly its going to sleep and its awakening corresponded to the times in its native forests, where the days and nights are equal.

Dr. Groos comments upon the perception which men have of traversing a certain distance with shut eyes, which he explains as an unmarked valuation of the rhythmical repetition of the paces. This, however, rests upon the perception of space, not of time.

That we have an inborn sense of the lapse of time lies in the nature of the human mind. Men could only have arrived at the belief that the rising and setting of the sun recur at regular intervals from an initial sense of the duration of time which they compared with their perceptions of the motions of the sun. This sense of time is more or less exact in different persons; it is capable of being cultivated by use, and is impaired by the habit of often consulting watches and clocks.

In opposition to Wundt's definition that expectation is a condition in which the active attention is directed not upon a present but upon a coming impression, or a number of such future impressions, Dr. Groos states his view that attention is not the concentration of the mind upon a present impression, but always and exclusively the expectation of a future impression, which will be answered with a more or less lively reaction. He distinguishes three principal forms—motor, theoretical, and æsthetic attention. In motor attention one awaits the occurrence of an instinctive or voluntary motion; in the theoretical form one awaits the coming of a certain association of ideas, and the æsthetic form is associated with the expectation of a burst of feeling which comes into the front ground of consciousness. The first form is especially related to the will; the second to the conceptions, and the third to the feelings.

It seems to me that our natural sentiment of the lapse of time is also shown by the correct anticipation of sounds which are apt to recur at regular intervals. After experiencing a succession of sounds, musical or otherwise, we learn to count upon their recurrence after a certain lapse of time.

THERAPEUTIC RETROSPECT.

By Harrington Sainsbury, M.D.

The Sedative Effect of Calomel in Large Doses.—In an interesting little book, entitled "Rough Notes on Remedies," Dr. Wm. Murray, of Newcastle, draws attention to the danger of forgetting some of our old friends amid the host of new remedies. Speaking of calomel he instances the great sedative value of this drug in large doses and the good effects which follow the administration of ten grains at the outset of delirium tremens occurring in a robust subject. Such was the practice, he tells us,