we are rarely the first to treat the patient, and the pupil is already under the influence of a miotic or a mydriatic. Surely stress should rather be laid on minute examination of the iris with a loupe; iritis can, I think, be always detected by this means; but most important of all is the examination of the nasal field of vision and of that near the blind spot.

But you will say that in the last paragraphs I have only been saying what I think I know, not what I do not know. Bear with me a moment. I spoke of an increased tonometric reading. I used this term because I do not know what it means.

In medicine generally an appalling ignorance of elementary physics is shown; we hear of blood pressure and arterial tension, of ocular pressure and ocular tension, as if they were synonymous expressions. Tension means a *pull*, and pressure means a *push*, as our master Priestley Smith sums up the matter. The tonometer gives the weight that will dimple or flatten the convex surface of the cornea. This depends upon the rigidity of the cornea, upon its curvature, and upon its size and the size of the globe, as well as upon the chamber pressure. Thus the internal pressure on the sclera and on the cornea is the same, but the tonometric reading is different. The internal pressure per square millimetre is the same in an aneurysmal sac and in the artery that feeds it, but the aneurysmal sac is the more stretched, is more tense, and consequently bursts, and would burst if stretched enough quite apart from any disease in its wall. The greater the curvature of the surface the more easily is it dimpled by the finger. Rayner Batten and later Priestley Smith have shown us this in a very simple and striking way¹; indeed, I have been quoting from this paper in the last ten lines. Further, the size and shape of the foot of the tonometer make a very great difference in the reading of the instrument. For all these reasons I personally distrust the value of any single reading with a tonometer. A series of readings made by the same observer with the same instrument on the same patient is invaluable in showing the progress of the case; but one observation which takes no account of the individual peculiarities of the eye may be most misleading.

The Chart of a Central Scotoma.

I do not know if it has any value. I see apparently most accurate charts published of central scotomata in different conditions, but how on earth can a chart be taken when the eye examined cannot fix its gaze definitely upon one point? One patient I saw three times in one week; on each day I took two charts—no one of the charts resembled another. The poor man could not keep his eye fixed in the same direction. I have tried fixing the sound eye in one case of monocular central scotoma, but I obtained discordant results with even this. I never attempt to take a chart of a central scotoma now—it seems to me pure waste of time. If anyone here can tell me how a central scotoma can be accurately traced I shall be exceedingly grateful, but until I learn how it can be done I shall continue to have the most profound distrust of all such charts.

REFERENCE.

¹ *British Journal of Ophthalmology*, 1923, p. 450.

DISCUSSION.

Mr. W. B. INGLIS POLLOCK (Glasgow) said that the most recent work on perimetry pointed strongly to the retinal origin of tobacco blindness, and the older pathology of fifty years ago was not quite reliable on nerve poisons.

Dr. PETER MACDONALD (York) agreed that tobacco amblyopia was usually due to such tobacco as shag and twist, but gave an account of an undoubted case of tobacco amblyopia due to cigarette smoking only.

Dr. J. W. TUDOR THOMAS (Cardiff), referring to paralysis of accommodation, described a case in a young man. There was no affection of the throat, and the only point of interest in the history was that he had sustained an ulcer of the little toe through wearing new football boots,

to which no especial significance was attached. The appearance of further symptoms led to bacteriological examination of the ulcer, which proved to be diphtheritic. Appropriate treatment caused the paralysis of accommodation to disappear.

PSEUDO-GLIOMA.

Mr. A. S. PERCIVAL (Newcastle-upon-Tyne) showed a gelatine specimen of pseudo-glioma in a child, aged 2, who was said to be recovering from meningitis. When he saw her she had left pseudo-glioma and right retrobulbar neuritis, from which she made a partial recovery; her sight improved considerably. The specimen showed a detachment of the anterior layer of the choroid and the retina by an effusion. The dense black pigment in front was probably due to blood. The vitreous was represented by the greyish material behind the lens. The specimen had been previously exhibited at the Convention of English-speaking Ophthalmologists. Mr. Percival urged the importance of searching for symptoms of retrobulbar neuritis where choked disc was anticipated but not found. In one case of cerebral tumour he found symptoms of retrobulbar neuritis (verified *post mortem*) and no choked disc.

Mr. Percival described experiments which appeared to indicate that pseudo-glioma, retrobulbar neuritis, and choked disc might all arise from the same condition.

On injecting the sheath of the optic nerve in the *post-mortem* room he had made the following observations:

1. In children under 5 the fluid under the sheath travelled directly to the lymphatic spaces in the choroid, detaching the anterior layer of the choroid and the retina from the posterior layer of the choroid and the sclerotic. This was the condition in pseudo-glioma.
2. In one adult he had found that the fluid met with a block at the site of the optic foramen, the bulging sheath being constricted beyond this point. This was the condition presumably in retrobulbar neuritis.
3. In all other adults the fluid met with a block at the scleral opening. This was the condition in choked disc.

Clearly the dura was continuous with the sclerotic, the arachnoid and pia with the choroid, and the nerve fibrils with the retina. It was, he believed, recognized that optic neuritis did not occur in dogs. In the only two dogs on which he tried this experiment, condition 2 was observed; probably in dogs retrobulbar neuritis always replaced choked disc in men.

COMPARISON OF THE NARCOTIC EFFECTS OF THE TWO HYOSCINES (SCOPOLAMINES).

BY

J. CHASSAR MOIR, M.B., CH.B.

(From the Pharmacological Laboratory, University of Edinburgh, and Royal Simpson Maternity Hospital, Edinburgh.)

HYOSCINE exists in two forms, which are identical in their reaction to ordinary chemical reagents but differ in the direction in which they rotate the plane of polarized light, and are therefore known as optical isomers. The laevo-rotatory alkaloid is that occurring in nature and used in therapeutics; the dextro-rotatory may be formed artificially from it. A mixture in equal parts of the two isomers, known as racemic hyoscine, is not infrequently met with, especially in old solutions of the natural form. While these forms cannot be differentiated by ordinary reagents, they can be distinguished by substances which themselves rotate the plane of polarized light and are optically active. In a number of instances similar isomeric substances have been shown to differ in effects in living tissues; for example, the natural laevo-rotatory hyoscyamine and adrenaline are some fifteen to twenty times as powerful as the dextro-rotatory hyoscyamine and adrenaline. It was therefore of importance to determine whether a similar difference existed in the two hyoscines. As regards their action on the peripheral nerves, the racemic form, containing equal amounts of dextro- and laevo-rotatory hyoscine, was found to be only one-half as powerful as

the laevo-rotatory,¹ and later experiments gave the activity of the laevo-rotatory as from sixteen to eighteen times that of the dextro-rotatory one.² In animal experiments on the narcotic action no satisfactory results were obtained, the effects seen in man not being elicited from correspondingly small doses in animals. The relative efficacy of the laevo-rotatory and racemic hyoscine was compared in man by Richards and Light (see Cushny and Peebles) without any significant difference being observed.

Professor Cushny recently asked me to compare the effects on the higher mental processes of dextro- and laevo-rotatory hyoscines, and I have done so on two lines of investigation: first, as regards their efficacy in producing "twilight" sleep, and secondly, their effects in controlling restlessness in cases of insanity.

The twilight sleep observations were carried out at the Edinburgh Royal Maternity Hospital, on cases under Dr. R. W. Johnstone's charge. Nearly 40 cases were recorded, but in many the drug was started late in labour, or was given irregularly. After deducting these, 27 remain in which more satisfactory conditions were observed. As far as possible the two varieties were given in alternate cases, the dosage being based on the following standard:

First hour: Morphine sulphate 1/6 gr. and hyoscine hydrobromide 1/100 gr.

Second hour: Hyoscine 1/200 gr.

Third and subsequent hours: Hyoscine 1/450 gr.

The majority of cases were primiparae. The average number of injections was twelve; a few cases received twenty or even more. For each case a special chart was kept, in which hourly progress was recorded, special attention being paid to the degree of intelligence and the state of the memory.

The *dextro-hyoscine* cases numbered 12. In no case was any amnesia or impairment of the intelligence observed, and in none was there any alteration in the sensation of pain. Sleep was not induced. Increase of the standard dosage caused no change in results.

The *laevo-hyoscine* cases numbered 15. In 10 there was complete amnesia, the patients remembering nothing after the first or second injection. They were completely oblivious to the passage of time, and although they had been a day or more in hospital many would declare that they had only just arrived. In 3 further cases amnesia was almost complete, while in 2 cases it was only produced slightly or not at all. The intelligence was markedly disordered, and often most absurd answers were given to questions. Usually after the second injection the patient lapsed into the curious dazed state of twilight sleep. These observations were made in a noisy labour ward, and, probably because of this, drowsiness and sleep were not always observed. Instead, the patient usually became mildly delirious, plucked at the bedclothes, and made many purposeless movements. Speech was slovenly, and when intelligible showed a state of complete disorientation with rapid flow of ideas of the nature of an occupational delirium.

The question of a depressant action on the child's respiratory centre was also considered. Among the laevo-hyoscine cases it was not unusual for several minutes to elapse before respiration was satisfactorily established. Among the dextro-hyoscine group oligopnoea was only encountered in those cases where labour had been prolonged and delivery difficult, and was therefore probably not due to the drug.

As a further experiment, 1/200 gr. dextro-hyoscine injected thirty minutes before delivery has caused no oligopnoea. An example of the failure of dextro-hyoscine may be given.

Mrs. D., aged 20, of medium build. Pains began at midnight and had been constant since; when she was admitted they were coming every three minutes; the pulse was 80, the pupils half dilated, the mouth rather dry.

At 12.30 p.m. an injection of 1/6 gr. morphine and 1/100 gr. dextro-hyoscine was given; at 1.30 another of 1/200 gr. dextro-hyoscine; at 2.30 1/450 gr. dextro-hyoscine; at 3.30 1/200 gr.; and at 4.30 1/450 gr. The patient became drowsy at 3.30, but the intelligence and memory remained "good" throughout. The pulse was 72 to 80 till 2.30, 68 at 3.30, and 64 at 4.30. The foetal heart was 124 to 128 until 3.30, and 116 at 4.30. Birth occurred at 6.45 p.m. and no oligopnoea was present. The mother's pupils were normal and no amnesia was present, and but slight dryness of the mouth.

After the administration of dextro-hyoscine a few patients became rather less restless, but it was impossible to determine whether this was due to the injection or to natural fatigue. It was therefore decided to determine the effect on cases of insanity associated with motor excitement. By permission of Dr. C. J. Shaw, this was done at Sunnyside Asylum, Montrose, the details of the observations being kindly worked out by Dr. C. J. Swanson.

Cases of long-standing motor restlessness were selected. Dextro-hyoscine 1/100 gr. was given to each on one occasion, and laevo-hyoscine on another. All the laevo-hyoscine cases showed the usual sedative effects of hyoscine, although this varied considerably in degree in different subjects. In none of the dextro-hyoscine cases was there any change observed which could be attributed to the drug, even repetition of the dose being ineffective.

Clinical Observations.

Case 1.—J. D., female, aged 54. Folie circulaire.

January 6th, 1925: For two days has been restless. Sings; is abusive; tries to get out of bed; has had no sedatives.

11.50 a.m. Dextro-hyoscine 1/100 gr. hypodermically.

12.20 p.m. Still noisy. Intelligence unchanged; pupils unchanged. This condition remained unchanged at 1.20 p.m.

January 7th: Before injection, noisy, restless, abusive.

3.25 p.m. Laevo-hyoscine 1/100 gr. hypodermically.

3.55 p.m. Drowsy but not asleep. Pupils dilated; tongue drier.

4.25 p.m. Very drowsy. Pupils dilated.

4.55 p.m. Drowsy and quiet, but not asleep. Pupils dilated; tongue dry.

Case 2.—A. K., aged 48.

January 6th: For months has been agitated and restless. Has been getting tr. opii mxv t.i.d. and paraldehyde zij almost every night to secure sleep. Before injection was restless and getting out of bed.

5.30 p.m. Dextro-hyoscine 1/100 gr.

6.0 p.m. Unchanged.

6.30 p.m. Unchanged. Pupils unchanged.

7.0 p.m. Rather quieter.

7.30 p.m. As before.

January 9th: Before injection was restless and getting out of bed. Is attempting to compress trachea with her hands.

2.45 p.m. Laevo-hyoscine 1/100 gr.

3.15 p.m. Drowsy, but not asleep. Pupils slightly dilated.

3.45 p.m. Asleep.

4.15 p.m. Awake, but quiet.

4.45 p.m. Restless once more.

Case 3.—R. C., aged 49. General paralysis of insane.

December 22nd, 1924: Has been restless all day. Has been on chloral (30 gr.) and bromide (40 gr.) for months. Last dose at 5.30 p.m. Before injection was very restless and bumping up and down in bed.

8.22 p.m. Dextro-hyoscine 1/100 gr.

8.52 p.m. No change.

9.20 p.m. Rather less restless. No change in pupils.

9.45 p.m. Asleep.

December 24th: Last chloral and bromide at 5.30 p.m.

8.45 p.m. Laevo-hyoscine 1/100 gr.

9.15 p.m. Rather quieter. Pupils dilated; tongue drier.

10.0 p.m. Asleep. Very confused on being aroused.

Case 4.—A. H., aged 62 years. Senile dementia. For three months has been restless, and will not stay in bed. Has been getting chloral gr. xx and bromide gr. xl t.i.d.

December 23rd: Before injection very restless, confused, and incoherent; jumping out of bed.

5.0 p.m. Dextro-hyoscine 1/100 gr.

5.30 p.m. Very restless; will not stay in bed. Pupils unchanged.

6.0 p.m. No change. Dextro-hyoscine 1/100 gr. repeated.

7.0 p.m. No change.

December 24th: Last dose of chloral and bromide at 6 p.m. two days ago. Before injection very restless and jumping out of bed.

5.0 p.m. Laevo-hyoscine 1/100 gr.

5.30 p.m. Still restless. Pupils dilated.

6.0 p.m. Less restless. Tongue dry.

6.30 p.m. As before.

10.0 p.m. Asleep.

From these clinical observations it would appear that only laevo-hyoscine is active in producing amnesia, in depressing the intelligence, and in controlling restlessness. The dextro-rotatory form in doses of 1/100 grain or more is apparently inert in these directions, and can only be regarded as a useless ingredient of hyoscine when present, to be eliminated where possible.

REFERENCES.

- ¹ Cushny and Peebles: *Journ. Physiol.*, 32, 1905, p. 50.
- ² *Journ. Pharmacol. and Exper. Ther.*, 17, 1921, p. 41.