

The Pupil and its Reflexes in Insanity. By A. H. FIRTH, M.A., M.D.Edin., Assistant Medical Officer, Wadsley Asylum, Sheffield.

PART I.

INTRODUCTION.

THE PUPIL IN HEALTH.

ANOMALIES OF THE PUPIL AND ITS REACTIONS.

PART II.

PUPILLARY SYMPTOMS IN CERTAIN TYPES OF MENTAL DISEASE:

- (1) General Paralysis.
- (2) Syphilitic Insanity.
- (3) Toxic Psychoses.
- (4) Insanity with Epilepsy.
- (5) Imbecility and Idiocy.
- (6) Hebephrenia, Katatonia, and Paranoia.
- (7) Melancholia of Involution.
- (8) Senile Dementia.
- (9) Manic-Depressive Insanity.
- (10) Terminal Dementia.

CONCLUSIONS.

METHOD OF EXAMINING THE PUPILS.

NOTE ON THE SYMBOLS USED IN THE TABLES.

LIST OF REFERENCES.

PART I.—INTRODUCTION.

IN the year 1850, Baillarger published an account of a new symptom which he had frequently observed in general paralysis, namely, inequality of the pupils.

Seifert, in 1853, writing on "Disturbances of the Mobility of the Iris in the Insane," pointed out that in the majority of instances cases of acute mania with miosis sooner or later developed definite signs of general paralysis.

In 1869, Argyll Robertson published his discovery that in spinal miosis the pupil contracts with convergence, but fails to contract on exposure of the eye to light. This marks an epoch in the history of the investigation of pupillary symptoms. Since then numerous observers have contributed to make the literature of the subject of vast extent. The condition of the pupil in organic nervous diseases has been closely investigated, and a good deal of attention has been given to the changes which it may undergo in so-called functional disorders of the nervous system and in mental diseases.

In the present instance the pupillary anomalies which occur in insanity are discussed from the clinical standpoint. A description of the pupil and its reactions in health is given in the first place ; next there follows a general account of the pathological variations that may be met with ; lastly, the incidence of pupillary symptoms in certain types of mental disorder is considered, with reference both to published records and to the writer's own observations.

THE PUPIL IN HEALTH.

The pupils are circular in outline, and of the same diameter in both eyes. When a change in size takes place the pupil remains circular, concentric with its former phase. As a rule the position of the pupil is not quite central with respect to the cornea, but slightly displaced inwards.

The pupils retain their equality under all conditions of illumination, accommodation, and convergence.

Slight variations from the circular form are of frequent occurrence, especially in association with small pupils, and such variations are to be regarded as physiological. Occasionally in otherwise normal eyes the position of the pupil is found to differ slightly from that above described. Schirmer (quot. Bach (2), p. 36) examined the effect of different strengths of illumination on the pupils of a number of healthy young adults, allowing sufficient time for complete adaptation ; he found that the diameter in each case remained practically constant for degrees of illumination ranging between 100 and 1100 metre-candles. This " physiological diameter " measured from $2\frac{3}{4}$ to $4\frac{3}{4}$ mm.

Age has a certain influence on the size of the pupils. The maximum diameter is reached before the age of twenty ; the size does not undergo much change between twenty and fifty, but thereafter it diminishes.

In hypermetropic eyes the pupil on the average is smaller than in emmetropic eyes ; in myopic eyes it is larger. In sleep the pupils are small ; on wakening they dilate widely, and do not assume their usual size until some time after consciousness is fully established. Light falling on the eyes does not prevent the preliminary dilatation.

PHYSIOLOGICAL REFLEXES.

(1) *The light reflex.*—If the intensity of the light which falls on the retina is suddenly increased, there is produced, after a latent period of about half a second, a marked contraction of the pupil; this is usually followed by slight dilatation, and again by contraction, and so on, until, after a series of rapidly diminishing oscillations, the pupil finally assumes a state of contraction. If the increased illumination persists, the contraction is well maintained for some time. It will tend to disappear as the eye adapts itself to the new intensity of lighting.

(2) *The consensual light reflex.*—If one eye alone be illuminated the pupil of the other eye contracts equally with its fellow, though the diminution in size is not so marked as in the case where both eyes are illuminated. Hence, when light is falling on both eyes, the shading of one eye is followed by a dilatation of both pupils.

Many authorities maintain that unequal lighting of the eyes causes a slight difference in the size of the pupils, the more brightly illuminated eye having the smaller pupil.

(3) *Reflex dilatation of the pupil from sensory and psychical stimuli.*—Painful stimulation of any sensory nerve causes both pupils to dilate; a deep needle-prick in the skin may cause an increase in size of more than 3 mm. (Bumke (8)). Further, every sense-impression that reaches the brain from the periphery, every sudden stimulation of the tactile, muscular, or special senses, produces a widening of the pupils. Actual sensation is not necessary for the production of this reflex; stimulation of an anæsthetic area of skin is followed by reflex pupil-dilatation if the anæsthesia is due to a central lesion or to hysteria, but the reaction cannot be produced if the anæsthesia is due to a peripheral lesion.

A similar reaction is caused by psychical stimuli; for instance, by excitement, anger, fear, or any strong emotion, by every volitional impulse, and every effort of attention. The impulse to dilatation resulting from such sensory or psychical stimuli is stronger than the strongest contracting stimulus from light (Bach (2), p. 73).

(4) *Pupillary unrest.*—Much attention has been given to this phenomenon by German observers. Bach describes it as follows:

“The size of the pupil in man in the waking state normally undergoes almost continual variations. These constant oscillations, which differ in character, in time, in amplitude, and in rapidity, show no synchronism with the action of the heart or the respiratory movements, and are independent of the variations of blood-pressure. Their action is apparently quite irregular; now one sees two or three oscillations in quick sequence, then a pause of one or two seconds, and again there follows a long series of oscillations at fairly regular intervals. These oscillations of the pupil, for which Laqueur introduced the apt title of ‘Pupillenunruhe’ (pupillary unrest), can be observed by the naked eye both in daylight, and especially in the dark-room with oblique illumination. They are most clearly perceptible in medium-sized pupils. For more accurate study, and especially for the observation of pathological conditions, examination with the Zehender-Westien loupe, or with the Zeiss corneal microscope is recommended.” The amplitude of the movements of pupillary unrest, when powerful sensory and psychical stimuli are as far as possible avoided, is not more than about $\frac{1}{4}$ mm. on the average. They are equal and simultaneous in both eyes and occur from 30 to 120 times per minute. There is a difference of opinion as to the causation of these movements, but in the words of Ballantyne (3), there is every reason to believe that all the various stimuli which influence the normal pupil play a part in the production of these physiological oscillations, and that they are the resultant of the many influences, exciting and inhibitory (if there be such), passing to the iris *via* the third nerve and the sympathetic.

It is important to draw a distinction between physiological pupillary unrest and the pathological condition known as “hippus,” in which the oscillations are very large, and easily seen, amounting to 2 or 3 mm.

(5) *Reaction of the pupils in near vision.*—If one is gazing into the distance, and the eyes are then directed to a near object, the pupils contract. In general the near object must be not more than 40 cm. from the face in order that an appreciable contraction may take place, and the contraction is more marked if the object be nearer. As a rule the maximum degree of contraction is elicited when the fixation-object is within about 10 cm. from the eyes. The amplitude of the contraction varies between $\frac{1}{4}$ and 3 mm. in different persons, seldom exceeding the

latter amount (Bach (2)). The contraction takes place equally in both eyes, and independently of the degree of illumination.

(6) *The lid-closure or orbicularis reflex.*—Forcible contraction of the orbicularis palpebrarum is accompanied by narrowing of the pupils. The observer should ask the patient to close the eyes firmly, while he himself holds apart the lids of one eye. It is important to bear this reaction in mind when one is attempting to examine the pupil-reactions of a refractory patient.

(7) *The galvanic pupil-reflex.*—A galvanic battery is arranged so as to send a weak current through the body, one pole being applied over the eye or on the temple close to the eye. With a suitable strength of current, closing or opening the circuit produces the sensation of light and contraction of both pupils. Closure of the circuit, the ocular pole being the anode, gives these effects with the smallest current. It is found that the minimum strength of current necessary to produce the light-sensation is less than that necessary to produce pupil-contraction, and that a fairly constant ratio exists between these values. In healthy subjects the proportion ranges between 1 : 1.5 and 1 : 4.0 (Bumke (8)).

(8) *The trigeminus-facial reflex.*—This reaction may be elicited by firm pressure on the skin at the external canthus, or by pricking the skin of the cheek with a needle for about half a minute. Both pupils dilate, and then quickly resume their former state; if the stimulation be continued, a gradual dilatation again takes place, which persists for about two minutes, and is followed by a slow contraction. When the stimulus ceases, the pupils resume their original size. The same reaction may follow tactile, thermic, or electrical stimulation of the eyelid, conjunctiva or cornea; but interference with the conjunctiva or cornea is much more likely to cause reflex closure of the eyelids, with miosis.

There is apparently an interplay of two impulses—one tending to dilatation of the pupils, and the other to reflex closure of the lids and miosis (Bach (2)).

ANOMALIES OF THE PUPIL AND ITS REACTIONS.

(1) *Irregularity and Eccentricity of the Pupil.*

The pupils of healthy persons have a circular outline in the

great majority of cases ; but slight variations from the round form are of frequent occurrence, and are to be regarded as physiological.

The pupil is usually not quite concentric with the cornea, but slightly displaced inwards. Slight variations from this location are sometimes found in otherwise normal eyes.

Congenital eccentricity of the pupil of marked degree is occasionally met with ; such a condition is usually known as ectopia pupillæ, or corectopia. It is convenient to employ the term "corectopia" in a wider sense, signifying any variation from the normal position of the pupil, whether marked or slight, whether of congenital origin or acquired in the course of disease.

Variations in the form or situation of the pupil may occur in diseases of the nervous system (including the psychoses). Such variations may be slight or marked ; they may occur merely as transient symptoms or as more or less permanent conditions.

Irregularity of the pupil-margin may assume different forms ; for instance, the pupil may be crenated, partly circular and partly angular, partly circular and partly rectilinear, polygonal, elliptic, oval, or pear-shaped. It is important to remember that distortion of the pupil may be of congenital origin ; it may be caused by past or present local disease of the eye, such as iritis or glaucoma ; or it may be a result of injury or surgical operation. Incomplete absorption of a mydriatic may occasionally cause a temporary deformity. In order to exclude irregularities due to synechiæ the eye should be examined under oblique illumination, and (in suitable cases) with the aid of a mydriatic.

The following extracts are taken from quotations in an article by J. Piltz (22) on the diagnostic value of irregularities of the pupil.

(a) Zieminski collected 207 cases of mental disturbance in which the pupils were irregular. These consisted of 198 general paralytics (including 15 cases of so-called alcoholic paralysis, and 2 of paralysis originating from lead-poisoning), 1 case of epilepsy, 5 of neurasthenia, and 3 of hysteria. He also observed that irregularity of the pupil may be an early symptom of general paralysis, present sometimes even in the premonitory stage.

(b) Marandon de Montyel concludes that irregularity of the

pupil-margin is practically a never-failing phenomenon in general paralysis, and that, moreover, it may occur in all other types of insanity.

(c) Joffroy and Schrameck believe that irregularity in the contour of the pupils indicates paralysis *progressiva*, *tabes dorsalis*, or *lues*; further, that this is as important as the Argyll Robertson symptom, and, indeed, forms its initial stage.

(d) In association with irregularity of the pupil, Salgo drew attention to unsymmetrical movement of the iris—that is, alteration in the contour of the pupil when its size changes. Different divisions of the iris show retardation or sluggishness of action in different phases of the movement—for instance, in the light-reflex contraction. He found this symptom chiefly in general paralysis; though it is not pathognomonic of the disease, he regards it as a very important sign, because in early cases it may be the sole physical evidence of commencing degeneration of the brain.

Piltz notes that different portions of the iris may show sluggishness of movement on different occasions of observation. He saw this change very often in progressive paralysis, and also in *katatonia*.

Piltz himself arrived at the following conclusions :

(1) There may exist the following pathological alterations of the pupil-margin :

(a) Temporary or changing irregularities, which are caused by a varying unsymmetrical movement of single portions of the iris.

(b) Disturbances of the position of the pupil.

(c) Constant irregularities of the pupil-margin.

(2) All these changes are very frequently observed in paralysis *progressiva*, *tabes dorsalis*, and *lues cerebro-spinalis*.

(3) Sometimes these derangements occur in the course of other nervous and mental diseases, but they are only exceptionally observed in healthy people.

(4) Transitory or changing unsymmetrical movement of portions of the iris is occasionally to be seen in *katatonia*.

(5) As irregularities of the pupil-margin sometimes precede the development of the Argyll Robertson symptom, they have considerable diagnostic importance (Piltz (22)).

Moeli sometimes found in chronic alcoholic patients that

only certain portions of the iris retained their mobility (Bumke (8)).

Albrand (1) has recorded eccentricity and irregularity of the pupil in cases of dementia præcox. His observations will be given later.

(2) *Mydriasis, Miosis, Anisocoria.*

Under physiological conditions the size of the pupils may vary within wide limits in different persons ; in each individual during the waking state the size of the pupil is subject, as we have seen, to constant variations. Hence it is sometimes difficult to decide, in a given case, whether the pupil-diameter is to be regarded as physiological or pathological.

Increase in the size of the pupil may be due to irritation of the pupil-dilating mechanism (spastic mydriasis), or to paralysis of the pupil-contracting mechanism (paralytic mydriasis).

Similarly, decrease in the size of the pupil may be due to irritation of the pupil-contracting mechanism (spastic miosis), or to paralysis of the pupil-dilating mechanism (paralytic miosis).

A discussion of the various lesions which may produce change in the size of one or of both pupils will not be entered upon. In the examination of insane patients, the observer must bear in mind the possible existence of disturbing factors. He must exclude such conditions as aneurysm of the aortic arch, tumour growth in the neck, diseases of the lung and pleura, cerebral tumour, hæmorrhage and softening, meningitis and syringomyelia. Fallacy may arise from the local application of mydriatics or miotics, or from the administration in other ways of substances which produce change in the size of the pupils.

Spastic miosis may be set up in one eye by local disease or irritation—for example, iritis, or a foreign body on the cornea. Miosis may also occur as an accompaniment of prolonged accommodative effort and spasm of the accommodation.

Mydriasis or miosis may be present in both eyes, or in one eye only ; or the symptom may be more marked in one eye than in the other. The following remarks have special reference to bilateral conditions.

Spastic mydriasis is found in cases of psychical excitement, and in the acute psychoses generally.

Paralytic mydriasis occurs during epileptic seizures, and sometimes in tabes, general paralysis, and cerebro-spinal syphilis. Mydriasis often accompanies exhaustion, fatigue, and anæmia; it may be found in hysteria and neurasthenia, and sometimes in migraine (on the affected side).

Paralytic miosis is met with in tabes and general paralysis.

Very small pupils are occasionally seen in senility and senile dementia.

Bumke (8) found that the pupil diameter in patients at the Freiburg Psychiatric Clinic was on the average larger than the physiological diameter ($2\frac{3}{4}$ to $4\frac{1}{4}$ mm.), and varied between $3\frac{1}{2}$ and 6 mm.

Bumke also observed that insane patients who had been refusing food before admission to the asylum showed maximal mydriasis, and somewhat sluggish light-reflexes; whereas, after artificial feeding had been used for some days, they showed normal innervation of the iris. He also carried out observations on a number of asylum night-attendants, and found that their pupils were wider in the morning following a night spent on duty than they were at the same hour on other days, and in the evening before going on duty. At the same time, the reaction to sensory stimuli was usually much more active, and the movements of pupillary unrest had a greater amplitude.

Inequality of the pupils—*anisocoria*—is easily detected, a difference in diameter of $\frac{1}{4}$ mm. being readily appreciated. *Anisocoria* without impairment of the pupillary reactions is not necessarily a serious symptom, for it may occur in healthy persons. Here the difference is usually not more than $\frac{1}{2}$ mm., and rarely as much as 1 mm.; the inequality persists in all states of illumination and convergence. Inequality of the pupils, associated with change in the pupil-reactions, may be taken as evidence of an organic lesion (Ballantyne (3)).

Anisocoria was found by Bierhoff in 188 out of 7,300 patients at the Marburg Eye-Clinic, that is, in about 2.6 *per cent.* (cases of glaucoma, trauma, and local inflammation were excluded). A congenital origin was assigned in 60 cases (Bach (2)).

Inequality of the pupils may be an expression of difference in the kind or degree of refractive error in the two eyes. Bierhoff found *anisometropia* to be the cause in 6 of his 188 cases of *anisocoria*.

Inequality of the pupils occurs in many organic nervous diseases, and also in functional disorders ; the condition may be transient, constant, or subject to change. The degree of anisocoria may vary from day to day, or even from hour to hour. The size-relation of the pupils may alternate ; at one time the right pupil may be the larger, at another time the left. This phenomenon has been named "*see-saw*" or "*dancing*" pupils. Three groups of cases are included under the term "see-saw pupils."

(1) Cases in which the size-relation of the pupils is reversed at longer or shorter intervals, it may be from day to day or from hour to hour ; usually the intervals are irregular ; most frequently each pupil becomes dilated in turn (*springende Mydriasis*). This symptom was first noticed in tabes and general paralysis, but it has recently been discovered to exist in apparently healthy subjects, and in cases of hysteria, neurasthenia, senile dementia, arterio-sclerosis, neuralgia, epilepsy, and other diseases.

(2) Cases in which one pupil undergoes change of size according to illumination, etc., becoming at one time larger, at another time smaller than its fellow, which remains fixed. The symptom here depends on unilateral paralysis of the sphincter pupillæ.

(3) Cases in which one pupil is normal, but the other undergoes notable changes of size, independently of illumination and convergence, so that it is now larger, now smaller than its neighbour. This condition is allied to hippus (Bach (2)).

(3) *Hippus*.

Even in healthy persons changes of the pupil-diameter amounting to as much as 2 mm. may occur as part of the normal pupillary unrest ; in hysterical and neurasthenic subjects and nervous children such variations are by no means rare (Bach (2)). True hippus consists in rhythmic movements of the iris, with an average period of from 1 to 3 seconds ; they have an average amplitude of 2 or 3 mm., and are independent of illumination, convergence, and sensory and psychical stimuli.

Hippus is sometimes observed as an independent symptom in tabes and general paralysis, as a forerunner of the Argyll

Robertson pupil. It has also been seen in certain stages of the epileptic seizure, and in post-epileptic confusion; it may occur in the seizures of general paralysis.

(4) *Amaurotic Rigidity of the Pupil.*

When a lesion causes unilateral loss of function of the retina or optic nerve, for instance, on the right side, neither pupil reacts to illumination of the right eye, but illumination of the left eye elicits contraction of both pupils. The other pupillary reflexes are not disturbed. Mydriatics and miotics have their customary effect on the pupil.

If the lesion causes bilateral loss of function, neither pupil reacts to light directly or consensually.

If the function of the retina or optic nerve is only partially affected, there is diminution instead of loss of the light-reflex.

In rare cases there may be loss of the light-reflex though vision is preserved, or there may be amaurosis without loss of the light-reflex.

(5) *Hemiopic Pupil Rigidity.*

This has been said to occur in association with homonymous hemianopsia, as the result of a lesion of one optic tract. Published observations of its occurrence have lately been subjected to much criticism.

(6) *Absolute Rigidity of the Pupil.*

The term "absolute" rigidity is used in contrast to "reflex" rigidity, and not in opposition to "partial" rigidity. In absolute pupil-rigidity the direct and consensual light-reflexes are absent in the affected eye, as well as the near-vision reaction, and the sensory and psychical reflexes. The pupil is usually moderately dilated. The symptom may be present in one eye, or, more commonly, in both eyes. If the symptom is not completely developed there is merely a reduction in the activity of the iris; usually the near-vision reaction is less affected than the light-reflex, and it may persist for some time after the disappearance of the latter. Such a condition may be mistaken for reflex rigidity.

Absolute rigidity is frequently a result of acquired syphilis,

more rarely of inherited syphilis, and it may occur in parasymphilitic conditions. In the latter case Bach (2) is inclined to regard the symptom as a direct result of the antecedent syphilis.

Various infections and toxic conditions may produce absolute pupil rigidity—for instance, influenza and diphtheria, lead, alcohol, and ptomaine poisoning.

This phenomenon has also been observed in senile dementia, epilepsy, hysteria, and acute excitement.

It must not be forgotten that this symptom may be due to glaucoma, injury, or the use of a mydriatic, and that confusion may thus arise.

The *myotonic reaction* is sometimes seen in cases of incomplete absolute rigidity. This consists in a very slow recovery of the pupillary contraction brought about by light, near-vision, or the orbicularis reflex, after the contracting stimulus is removed.

Bach (2) states that he never found this condition apart from incomplete absolute rigidity of the pupil.

When absolute pupil-rigidity is associated with paralysis of accommodation, the condition is known as *ophthalmoplegia interna*. It may be bilateral, like or unlike in degree in the two eyes, or more frequently unilateral. The pupils are dilated. Often the ciliary muscle is affected to a less degree than the iris.

(7) *Reflex Rigidity of the Pupil.*

This symptom was described by Argyll Robertson in 1869, and is universally known by his name. He observed that in spinal myosis the pupils fail to react to light, but become smaller in near vision. As a rule, reflex rigidity develops gradually; the direct and consensual light-reflexes and the reaction to sensory stimuli become more and more sluggish, and myosis may appear; the near-vision reaction, however, remains normal, or in many cases becomes abnormally active.

The symptom may be unilateral or bilateral, or present in different stages of development in the two eyes.

Cases are occasionally seen in which the direct and consensual light-reflexes are absent, but the sensory reaction is retained, and there is no miosis.

Anisocoria is frequently present. The size of the pupils may show change from day to day, or may undergo more gradual variation. Irregularity of the pupil-margin is very common; it usually persists after the use of mydriatics and miotics.

Irregularity is often present before the development of the Argyll Robertson symptom, and it is even regarded by some as having a similar diagnostic significance.

The lid-closure reflex is often easily elicited. Several instances are recorded of return of the light-reflex — for example, during remissions in general paralysis. Bach questions the accuracy of these observations.

Typical reflex-rigidity is always a sign of organic disease of the nervous system. Most authorities agree in stating that the Argyll Robertson pupil is found almost exclusively in tabes dorsalis, general paralysis, and congenital and acquired syphilis; only exceptionally in other diseases of the nervous system. Such possible exceptions are certain focal cerebral lesions, especially of the corpora quadrigemina (Mott (19)), syringomyelia, and rare cases of multiple neuritis (Cestan and Dupuy-Dutemps (10)).

Unilateral Argyll Robertson pupil has been known to follow a punctured wound in the orbit (Laqueur (15); Hirschberg (30)).

When reflex pupil-rigidity is found in patients without other signs of tabes or general paralysis, and with a history of past syphilitic infection, an important question arises. If the presence of the Argyll Robertson symptom merely indicates a previous syphilitic infection, its diagnostic value is relatively slight, but if it points to the existence of the degenerative changes underlying tabes or general paralysis, it is a symptom of grave omen. Clarke (11) favours the latter view; he quotes thirty-seven cases of gross syphilitic disease of the nervous system, in not one of which the symptom was present in its complete form. Bumke (8) quotes Thomsen as authority for the statement that the Argyll Robertson phenomenon may be present for as long as eleven years before the development of other signs of tabes or general paralysis; but he believes that it is not permissible to assume that the presence of reflex pupil-rigidity in syphilis always indicates a metasyphilitic degeneration of the nervous system.

Siemerling, quoted by Bach (2), examined 923 female insane patients, and found reflex-rigidity in 79, incomplete reflex-

rigidity in 14 more. His results are given in the following table, which shows in how many cases and in what conditions the symptom was observed :

Disease.	Light reaction absent.	Minimal light reaction.
General paralysis	63	12
Epilepsy	2	1
Hysteria	1	—
Paranoia	—	1
Senile dementia	2	—
Alcoholism	2	—
Syphilis	2	—
Tabes with psychosis	5	—
Hemiplegia	1	—
Cerebro-spinal meningitis	1	—
	—	—
	79	14

It appears that in nearly 90 *per cent.* of the cases the symptom was associated with general paralysis, tabes, or syphilis. Siemerling also examined 9,160 patients at the Charité, of whom 1,639 had reflex-rigidity : 1,524 of these, or over 95 *per cent.*, suffered from general paralysis, tabes with mental symptoms, or cerebro-spinal syphilis. His figures are given in the following table :

	Cases.
General paralysis	1,524
Tabes with psychosis	29
Senile dementia	19
Syphilis of the central nervous system	17
Focal lesions	19
Alcoholism	15
Injury of the head	1
Epilepsy	4
Hysteria	4
Paranoia	7
	—
	1,639

Bach makes the apt criticism that many of the non-tabetic and non-paralytic cases enumerated above might eventually prove to be suffering either from general paralysis or from tabes.

Moeli, quoted by Bumke (8), observed reflex pupil-rigidity in 56 patients whose condition could not be diagnosed at the time as general paralysis or tabes. Of these, after a period of from three to six years had elapsed, 14 were recognised as tabetic and 7 as paralytic; 10 had cerebral disease other than general paralysis, and were either syphilitic or alcoholic patients; the remaining 25 were probably not syphilitic. Moeli estimated that 98.6 *per cent.* of all his cases of reflex-rigidity were either paralytics or tabetics.

Amaurotic rigidity, absolute rigidity, and the Argyll Robertson symptom may be mistaken for one another. Ballantyne (3) lays stress on the following points of distinction. Both in reflex and in amaurotic rigidity we find absence of the light-reflex with preservation of the near-vision reaction; in the latter case, however, there is blindness, usually with mydriasis; in the former case blindness is a rare complication, and there is usually miosis, and often an undue activity of the near-vision reflex. Typical cases of reflex-rigidity and absolute rigidity are easily distinguished by the absence of the near-vision reflex in the latter. It may be difficult or impossible to distinguish the Argyll Robertson pupil from the incomplete form of absolute rigidity in which a convergence reaction is obtainable. The distinction must depend chiefly on the presence or absence of miosis, and on the state of the near-vision reflex. In incomplete absolute rigidity the near-vision reflex, if present, is deficient, or may show the myotonic character, whereas in the Argyll Robertson pupil the convergence contraction is active, and may be unusually well-marked.

Bach maintains that the true Argyll Robertson symptom never develops into absolute pupil-rigidity. If this statement be correct, it is of value from the diagnostic point of view, for reflex-rigidity has a very close association with tabes and general paralysis, while the absolutely rigid pupil occurs in a wide variety of diseases.

The *neurotonic reaction* consists in a slow contraction of the pupil, produced only after illumination has been continued for some time. The contraction usually remains for some seconds, occasionally rather longer, and then slowly passes off. This symptom may be seen in certain cases where amaurotic rigidity is being developed, more rarely in incomplete reflex-rigidity (Bach (2)).

(8) *Paradoxical Light-reaction.*

This consists in dilatation of the pupil when the eye is illuminated, and contraction when it is shaded; it may be elicited either directly or consensually. Usually the near-vision reaction is normal.

This condition is very rare. It may be simulated by other phenomena.

Bach remarks that in cases of marked paresis of the sphincter pupillæ, illumination of the eye produces a very slight contraction of the pupil, followed by a fairly quick and occasionally marked dilatation, which is due to atony of the sphincter. It would not be permissible to describe this phenomenon as an instance of paradoxical reaction.

(9) *Failure of the Near-vision Reaction.*

Occasionally it is found that the light-reflex is preserved, but the pupil fails to contract in near vision. This phenomenon has been recorded by Lauder Brunton (7) in a number of cases of alcoholic neuritis. It is not uncommon in post-diphtheritic neuritis (Purves Stewart (23)), and it has been exceptionally observed in general paralysis (Wernicke, quot. Laqueur (15)).

(10) *Perverse Near-vision Reaction.*

This condition is exceedingly rare; it consists in dilatation of the pupil in looking at a near object, and contraction in gazing into the distance.

(11) *Loss of the Reaction to Sensory Stimuli.*

Loss of the reaction to sensory stimuli usually accompanies absolute and reflex rigidity of the pupil. It may be caused by a lesion which breaks the path of the sympathetic supply to the iris. It has been observed in katatonia and other mental diseases, apparently as a functional symptom, often without impairment of the reactions to light and near vision. On the whole, this condition is most frequently found in association with the Argyll Robertson pupil.

(12) *Absence of Pupillary Unrest.*

Absence of pupillary unrest usually occurs in the same conditions as absence of sensory reflex. Bumke has drawn attention to its occurrence in dementia præcox. He has also observed that in many patients pupillary unrest and the reaction to psychical stimuli may be absent at a time when the reflex dilatation of the pupil from painful stimuli can still be obtained.

(13) *Undue Activity of the Sensory Reflex, and Exaggeration of Pupillary Unrest.*

Undue activity of the sensory reflex, and exaggeration of pupillary unrest have been observed in some of the neuroses, such as hysteria, in certain stages of alcoholic intoxication, and in states of fatigue (Bumke (8)).

(14) *The Trigeminal Facial Reflex.*

The trigeminal facial reflex is said to be present in all healthy persons, but in insane patients, especially in general paralytics, it is often altered or altogether absent (Stefani and Bordera, quot. Bach (2)).

(To be continued.)

Clinical Notes and Cases.

On a Case of "Pellagra" in an Insane Patient. By
F. E. RAINSFORD, M.D., Medical Superintendent, Stewart
Institution.

THE case I wish to bring under your notice to-day is interesting, inasmuch as it is, so far as I have been able to ascertain, the first recorded case in Ireland.

Most of you have probably noticed in recent issues of the medical journals various papers recording cases in English asylums, and it was from the information therein afforded that I was enabled to recognise the case in question.