most capricious fashion. It was seen on three occasions in the 30 experiments upon which their paper is based. I put it to you that if there was evidence of extrasystolic beats—allowing that fibrillation is of this nature—on only three occasions in 30 experiments confined to interference with the heart nerves, then we must inevitably conclude that the vagal stimulation, so often repeated without success, was no more than one, and probably by no means the chief causative factor. If we are to conclude that nervous impulses, acting alone, are capable of producing extrasystolic beats, we require far stronger evidence than this. An experiment must be devised in which by such interference the result is invariable or almost invariable; and evidence of this kind is necessary, for we now know the causes of extrasystole are of a most elusive kind, and creep into experiments unseen and unheeded. The isolated examples of fibrillation in Rothberger and Winterberg's experiments are to be ascribed largely, if not entirely, I think, to such factors.

We pass finally to a discussion of observations of a somewhat different kind. I refer to the later papers of Rothberger and Winterberg and to those of Levy.⁷ The former writers have shown that stimulation of the sympathetic nerves is followed by beats of an extrasystolic nature when the heart has been previously poisoned by barium chloride. Levy has shown that sympathetic stimulation is followed by the appearance of beats of the same kind, or by their increased formation, when the heart is poisoned with small doses of chloroform. The evidence for both these statements is, I think, conclusive.⁸

It has to be acknowledged that the nerves of the heart may play a very significant rôle in producing the disorders of mechanism considered. Can we define this rôle more distinctly? There are, so it seems to me, two questions to which answers may be returned at the present time. Has it been shown that abnormal nerve impulses playing upon a normal heart may be responsible for extrasystoles or the higher types of disorders? To this question we may return a negative answer. May nervous impulses playing upon a supersensitive or irritable organ provoke these curious contractions? To this question we may return an answer in the affirmative.

It is a striking fact that both in the experiments of Rothberger and Winterberg with barium chloride, and in those of Levy with chloroform, before the sympathetic is stimulated, conditions predisposing to extrasystole are known to be affecting the heart. Given such conditions, the sympathetic influences enhance the pre-existing tendency, and the disturbance or an exaggerated disturbance follows. So far, and no further, are we warranted in carrying our conclusions to-day.

⁷ Rothberger and Winterberg: *Zentralblatt für Physiologie*, Band xxv.; also *Pflüger's Archiv*, 1911, cxlii., 46; Levy and Lewis: *Heart*, 1911-12, iii., 99; Levy: *Heart*, 1912-13, iv., 319; and 1913-14, v., 299.

⁸ Many of Rothberger and Winterberg's curves are open to the objections raised in criticisms of the earlier paper, but in some of their published figures the new beats have all the features of extrasystoles, and must, I think, be accepted as such.

OBSERVATIONS UPON 31,000 CONSECUTIVE MEDICAL EXAMINATIONS, CONDUCTED CHIEFLY FOR THE PUBLIC SERVICE.

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THE following observations are based upon 31,000 consecutive medical examinations made on behalf of two large public bodies and various insurance companies and solicitors during the last nine years. The figures are arranged in the following groups:—

	Cases.	Examinations.
I. Entrance examinations as to physical fitness	12,189	13,526
II. Accidents amongst employees	3,667	6,858
III. Sickness amongst employees	3,499	7,391
IV. Medico-legal cases	2,216	3,396
	21,571	31,171

I.—Entrance Examinations as to Physical Fitness.

Results of Medical Examination as to Physical Fitness of Candidates for Entrance into the Public Service.

Passed at first examination	9694
Passed after postponement	990
Passed temporarily, subject to re-examination yet to take place	82—10,766
Rejected at first examination, one disability only...	1037
Rejected at first examination, more than one disability	149
Rejected after postponement...	237—1,423

(Representing 13,526 examinations.) 12,189

Proportion of rejections.—A comparison of the figures contained in this table with those presented in 1911 will show that the proportion of candidates for the public service I have had to reject has considerably increased. Up to 1911 the percentage of rejections was 9.9 per cent., but in the past three years I have found it necessary to refuse 14.4 per cent. A large part of this increase is due to the number rejected on the ground of dental caries. It seems incredible that such a large number of people are ready to forfeit their chance of employment rather than undergo the treatment necessary to put their mouths into a proper condition.

Summary of Causes of Rejection of 1423 cases.

Defective visual acuity	479	Hydrocele	8
Dental caries	254	Refused physical examination	7
Heart disease	110	Obesity	6
Albumin	109	Goitre	6
Colour blind	103	Hæmorrhoids	5
Hernia	82	Anæmia	5
Varicose veins	54	Alcohol	4
Disease of lungs	25	Gonorrhœa	4
Poor physique	22	Mentally defective	4
Syphilis	18	Tubercular spine	3
Various skin diseases	16	Deformity	3
Diabetes	13	Urethritis	3
Varicocele	11	Fainted at vaccination	3
Debility	10	Various conditions of infrequent incidence	48
Deafness	8		

Varying standards.—The relative proportions of most of the defects which have led to rejection are very fairly maintained. Some of the variations may be accounted for by the differing standards of tests which have to be applied, having regard to the diverse natures of the employments proposed. Thus drivers of tramcars and fireman must have perfect vision, but there is no reason why those seeking employment in a clerical capacity should not be passed, even though possessing defective vision, provided suitable corrective lenses are procured.

Desirability of medical examination prior to employment.—Having regard to the large percentage

OXFORD OPHTHALMOLOGICAL CONGRESS.—Mr. Sydney Stephenson has been elected master of the Congress, vice Mr. R. W. Doyne, nominated as past-master. Mr. P. E. H. Adams (Oxford) has become deputy master, and Mr. A. Bernard Cridland (Wolverhampton) honorary secretary. Colonel R. H. Elliot, I M S, has been elected a member of the council.

of rejections I think I am justified in again urging the desirability of instituting a system of medical examination prior to employment. I do not advocate the employment of only those who are physically perfect (the army of unemployed would be of enormous dimensions if that standard came into operation), but I feel that in dealing with subsequent injuries or illnesses the advantage to be derived from a knowledge of pre-existing defects would be enormous, and, in addition, many men would not be permitted to undertake work the performance of which would be inviting disaster to themselves and others in their particular physical condition. Men with heart disease are often employed to perform heavy work because of their apparently robust condition, but a medical examination would disclose their total unfitness for anything of the kind. The big rise in the number rejected on account of poor physique from 4 to 22 need cause no alarm as being evidence of physical deterioration in the race, because in such a body as the Fire Brigade a very high standard of physique is demanded.

Examination of urine. (a) *Sugar.*—I have confirmed by further observation the opinion I expressed in 1911, that the indications of glycosuria (high specific gravity and crystals of glucosazone) so often found upon a first examination of urine are frequently merely temporary, and are the result of the mental anxiety and physical stress which so many candidates experience when appearing before the committee of a public authority and undergoing a medical examination with a view to securing an appointment. Although glycosuric urine is often indicative of the early stage of true diabetes, and the urine in these cases may respond to all the tests demonstrating diabetes, I believe the condition may well be of a temporary character and should not necessarily lead to rejection. Even if the diabetic condition is undoubted, the nature of the employment proposed may justify a pass. I remember the case of a professional man, aged 58, who had diabetes, but as his services were only required for some eight or ten years I ventured to take the risk, and after stating the facts quite frankly to his future employer advised his acceptance. He duly served his time, and died two years after leaving the service.

(b) *Albumin.*—The examination of considerably over 5000 further specimens of urine strengthens my opinion that we have not by any means reached the limit of the knowledge to be obtained by this procedure. No candidates for the public or any service should be refused admission merely because a first examination of the urine discloses the presence of albumin. Even if albumin is persistently present (it is frequently only temporarily so) it is not fair, especially to young candidates, finally to reject them until the centrifugalised deposit has been microscopically examined. In a large number of cases a second specimen of urine, although passed but a few minutes after the first, will show no trace of albumin, the probability being that the first reaction was produced by nuclear albumin obtained from a deposit lying in the urethra, the result, may be, of an old gleet.

Physiological or adolescent albuminuria certainly does not point to organic change in the kidneys. In the vast majority of specimens of urine passed by people under 22 or 23 years of age the presence of albumin will be found to be a temporary condition. My friend, Sir James Goodhart, tells me that he finds that when albuminuria is merely

functional cold acetic acid when added to the urine causes it to assume a cloudy opalescent appearance. He adds: "I am sure this is a really valuable constructive test, for this is hardly ever found with nephritic albumin." In order to determine whether the albuminuria is or is not due to definite nephritic mischief the deposit should be subjected to microscopic examination at stated intervals on several consecutive days. Hyaline casts alone do not indicate disease.

Dental caries.—During the past three years I have paid special attention to the question of pyorrhœa alveolaris and the absence of healthy teeth. Many of the septic conditions—e.g., rheumatoid arthritis, rheumatism—the origin of which until recently has been sought in vain, will be found to be due to the slow, chronic poisoning brought about by the condition in which the working classes keep their teeth. A comparatively slight degree of traumatism is increased, and the period of convalescence unduly prolonged by the presence of oral sepsis; on several occasions the removal of decayed teeth during the period of disablement following an accident has facilitated recovery. I think, therefore, that when examining for admission into the public service special care should be taken that the teeth of a candidate are in good condition, so that he may not only digest his food and maintain his health, but that in the event of an accident recovery may not be delayed by the impetus traumatism seems to give to general septic absorption from pyorrhœa alveolaris. I have been much struck by the unwillingness of candidates to have decayed teeth extracted, and find that the shorter the period allowed them for extraction the more likely are they to have extractions performed. I now make it a condition of acceptance into the service that the mouth shall be in a healthy condition.

II. AND III.—*Examination of Employees for Accidents and Sickness.*

In my former report I stated that employees who have been on the sick list for 28 days from any cause are sent to me for examination and report, and that this was found to be a considerable check upon the temptation to malingering or unduly to prolong illness after accidents or sickness. Further, I pointed out that the 28-day rule, though by no means equal to systematic re-examination at set intervals, certainly enables me to keep an eye to some extent generally upon the health of the staff. For instance, a tramway driver was discovered to be suffering from aortic regurgitation and a school attendance officer from locomotor ataxia when they presented themselves on the expiration of 28 days' sick leave on account of a slight injury in the first case and a sprained ankle in the second. Recently this rule has been modified in certain sections of my work, accident cases being submitted as soon as practicable after their occurrence, without waiting for 28 days to expire.

Results of Examination of Employees as Regards Fitness for Work.

	Total accident and sickness cases. (7166).	Accident cases only. (3667).	Sickness cases only. (3499).
1. Cases certified fit for duty on first examination	20.2%	23.3%	17.7%
2. Cases requiring further leave from the date of the first examination ...	60.8%	64.4%	55.8%
3. Cases permanently unfit after single or final examination; also including deaths immediately under my notice... ..	13.3%	4.3%	23.9%
4. Undoubted malingerers	5.5%	8.0%	2.6%

Classification of 3667 Cases of Accidents. (Representing 6858 examinations.)

Contusions of limbs	748 = 20.4 per cent.
Wounds (various) of limbs	617 = 16.8 "
Fractures of bones	341 = 9.3 "
Sprains of limbs... ..	281 = 7.7 "
Herniæ	231 = 6.3 "
Back, injuries of	216 = 5.9 "
Head injuries and traumatic neurasthenia	204 = 5.6 "
Injuries to the eye	190 = 5.2 "
Synovitis of knee	124 = 3.4 "
Burns	85 = 2.3 "
Injuries of chest and neck	57 = 1.6 "
Injuries of abdomen, pelvis, and organs of generation... ..	46 = 1.2 "
Dislocations of limbs	46 = 1.2 "
Amputation of fingers for traumatism ...	32 = 0.9 "
Displaced semilunar cartilage of knee ...	30 = 0.8 "
Injuries of ear and mouth	22 = 0.6 "
Unclassified	104 = 2.8 "
Undoubted malingerers... ..	293 = 8.0 "

There is still a tendency to make the happening of a slight injury the pretext for obtaining the utmost amount of compensation. It is obvious that, if my experience is not singular, a state of things is arising that calls for careful attention.

*Classification of 3499 Cases of Sickness, showing Proportion of Certain Diseases of More Frequent Incidence. (Representing 7391 examinations.)**Infective Diseases, 968 cases = 27.7 per cent.*

Pulmonary and laryngeal tuberculosis	230
Influenza	170
Rheumatism	170
Pneumonia	95
Rheumatic fever	72
Enteric fever... ..	53
Primary syphilis (secondary syphilitic conditions are classified under systems particularly affected) ...	31
Rheumatoid arthritis	21
Tonsillitis	18
Empyema	15
Rheumatic gout	15
Scarlet fever	15
Diphtheria	14
Pulmonary tuberculosis suspected	11
Laryngitis, non-tubercular	6
Mumps	5
Actinomycosis	1
Various conditions of infrequent incidence	26

Diseases of the Nervous System, 602 cases = 17.2 per cent.

Neurasthenia	221
Insanity and mental depression... ..	83
Sciatica	53
General paralysis of the insane and locomotor ataxia ...	51
Cerebral hæmorrhage	37
Epilepsy	36
General mental deterioration... ..	13
Disseminated sclerosis	10
Paralysis agitans... ..	7
Heatstroke and sunstroke (not accident under the Workmen's Compensation Act)	7
Writer's cramp	6
Various conditions of infrequent incidence	78

Diseases of the Digestive System, 341 cases = 9.8 per cent.

Gastric conditions	106
Appendicitis	63
Diseases of the rectum	42
Hæmorrhoids	39
Diseases of the liver	32
Duodenal ulcer	18
Abscess of jaw	5
Various conditions of infrequent incidence	36

Diseases of the Circulatory System, 255 cases = 7.3 per cent.

Valvular disease of the heart	136
Varicose veins and ulcers, thrombosis and phlebitis ...	93
Fainting on duty	11
Arterio-sclerosis	4
Various conditions of infrequent incidence	11

General Diseases, 243 cases = 7.0 per cent.

Debility	71
Premature senility	61
Anæmia	42
Gout	35
Obesity	9
Boils... ..	7
Various conditions of infrequent incidence	18

Diseases of the Respiratory System, 236 cases = 6.8 per cent.

Bronchitis and bronchial catarrh	125
Pleurisy	47
Asthma	45
Various conditions of infrequent incidence	19

Diseases of the Organs of Locomotion, 119 cases = 3.4 per cent.

Lumbago	38
Ulcers of leg and foot	20
Bursitis	7
Bunion	6
Tubercular synovitis of knee	3
Tubercular abscess of foot	1
Various conditions of infrequent incidence	44

Diseases of the Urinary System, 106 cases = 3.0 per cent.

Nephritis	61
Diabetes	17
Stone in kidney or bladder	12
Cystitis	4
Various conditions of infrequent incidence	12

Diseases of the Eye, 105 cases = 3.0 per cent.

Defective vision (various causes)	36
Conjunctivitis	13
Iritis... ..	11
Cataract	10
Choroiditis	6
Ophthalmia	4
Glaucoma	3
Various conditions of infrequent incidence	22

Diseases of the Skin, 101 cases = 2.9 per cent.

Eczema	28
Sycosis	11
Erysipelas	9
Ringworm	8
Various conditions of infrequent incidence	45

Morbid Conditions Incident to Various Parts, 92 cases = 2.6 per cent.

Cancer	62
Various conditions of infrequent incidence	30

Toxemias, 80 cases = 2.0 per cent.

Alcoholism	75
Various conditions of infrequent incidence	5

*Diseases of the Generative System, male and female, 64 cases = 1.8 per cent. (18 of these cases venereal.)**Diseases of the Ear, 40 cases = 1.2 per cent.*

Deafness due to various causes	1
Middle-ear suppuration	8
Mastoid abscess	5
Various conditions of infrequent incidence	11

Diseases of the Lymphatic System, 37 cases = 1.1 per cent.

Tubercular glands	11
Inflamed glands, not tubercular	10
Myxædema	1
Various conditions of infrequent incidence	15

*Diseases of the Nose, 19 cases = 0.6 per cent.**Undoubted malingerers, 31 cases = 2.6 per cent.*

Alcoholism.—I should like specially to refer to the cases of alcoholism, many of which are frequently submitted to me for report. In these cases the temptation is to consider the service and ignore the individual. During the past nine years there have been many cases of undoubted alcoholism; none of these have been dismissed peremptorily. I have taken a special interest in each case, and tried to gain the confidence of and assist those who have promised to coöperate with me in helping them to abstain totally from alcohol. In many instances I have been able to bring about total abstinence and restore self-respect. It is difficult to be accurate in dealing with this question; failure is so common, and deceit and falsehood (the consequences of a depraved mental condition) are almost invariably present. Close touch with the heads of departments has, however, afforded me special facilities. The following are the results to date of 43 consecutive cases coming under my care since 1908:—

No relapse. Quite satisfactory. Total abstainer one year or over	15
Total abstainer under one year	5
Relapsed and recovered. Moderately satisfactory. Either total abstainer for a period under 12 months from relapse, or only semi-abstainer... ..	9
Relapsed. Unsatisfactory. Died or lost sight of	14

As statistics go, I think it will be found that these are unusually satisfactory results, which may

perhaps be explained by the fact that the men concerned are fully cognisant that their irregularity has been reported to me as medical examiner, and that practically I have the final say as to their retention in the service. Hitherto in every case I have taken full advantage of my somewhat autocratic position, and I find it of much assistance in compelling the exercise of that will power which is so essential to recovery from this disease, but which, from the nature of the complaint, is so difficult to bring into operation. A judicious exhibition, often even a parade of despotic authority, combined with a personal and sympathetic interest (in most cases entailing frequent unofficial interviews), has brought about results which are the best, I believe, that have been published. They are so gratifying that they may well be an incentive to others similarly placed.

Venereal disease and its sequelæ.—Much attention is at present being paid to the subject of venereal disease, and some interest may be found in the following particulars of the cases which have come under my observation:—

A. In the 12,189 entrance cases—

Primary syphilis		23 cases.
Gonorrhoea		5 "
Urethritis		4 "
Locomotor ataxia		1 "
Urethral chancre		1 "
Syphilitic iritis		1 "
Gleet		1 "

36 (= 0.29%).

B. Amongst the 3667 accident cases there were 2 cases of locomotor ataxia accelerated by traumatism. There was also 1 case of gonorrhoea.

C. In the 3499 cases of sickness:—

Primary syphilis		31 cases.
Gonorrhoea (including orchitis, cystitis, urethritis, and epididymitis)		19 "

Definite specific history in the following:—

Arterio-sclerosis, syphilitic		4 cases.
Aneurysm		9 "
Glossitis		1 "
Cataract		1 "
Choroiditis		2 "
Ptosis		1 "
Laryngitis		3 "
Progressive muscular atrophy, syphilitic		1 "
Tonsillitis, syphilitic		1 "
Disease of ankle, syphilitic		1 "
Ulcer of ankle		"
Gumma of thigh		2 "
Ulcer of knee		1 "
Synovitis of knee		1 "
Locomotor ataxia and general paralysis of the insane		51 "
Gumma of brain, syphilitic		2 "
Mental aberration		1 "
Skin disease		3 "
Paralysis due to syphilis (Also 1 case doubtful syphilitic.)		1 "
Cerebral hæmorrhage, syphilitic (Out of a total of 29 cases.)		8 "
Epilepsy, syphilitic (Also 8 cases doubtful syphilitic, out of a total of 36 cases.)		7 "
Chorea (one case doubtful syphilitic)		—
Iritis, syphilitic (Also 4 cases doubtful syphilitic, out of a total of 11.)		2 "
Disseminated sclerosis, syphilitic (Also 1 case doubtful syphilitic out of a total of 10.)		1 "

156 (= 4.4%).

D. Of the 2216 medico-legal cases there was definite indication of venereal disease in 19 cases, and strong suspicion of it in at least 6 others.

IV.—Medico-legal Cases.

An analysis of the 2216 medico-legal cases in view of their special character would serve no very useful purpose, so I content myself by remarking that I have not discovered anything in them to vitiate any of the deductions I have drawn from my other examinations.

Porchester-terrace, W.

ON A METHOD OF MAKING CULTIVATION MEDIA WITHOUT PREPARED PEPTONES, AND ON A PEPTONE-FREE MEDIUM FOR GROWING TUBERCLE BACILLI.

BY S. R. DOUGLAS, M.R.C.S. ENG., L.R.C.P. LOND.,

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IN the past, owing to the ease with which various chemical products could be obtained, bacteriologists have been satisfied to follow blindly a ritual of media-making. With the outbreak of the war, however, the supply of one important ingredient, Witte's peptone, almost universally used in this ritual, was suddenly cut off, and it became imperative—especially in this laboratory, where very large quantities of culture media are being used for the preparation of vaccines for our Army and Navy, and also for the French Army—to look forward and prepare for the time when Witte's peptone was no longer available. The preparation of media without the addition of prepared peptones has had to be provided for in the past; for instance, Haffkine was faced by a similar problem when he undertook to make plague vaccine for the natives of India. Since peptone, being derived from pigs, is abhorrent to a Mohammedan, and the use of beef in any form equally so to a Hindu, Haffkine overcame both these difficulties by autoclaving goat's flesh with hydrochloric acid, and obtained a satisfactory medium.

The method of media-making described below gives constantly a very efficient medium, and has proved in my hands more simple and easier than Haffkine's method. Fresh bullocks' hearts having been obtained, the fat and large vessels are removed. The meat is then finely minced, and to the mince thus obtained from an average-sized heart four litres of water are added. This mixture, after being thoroughly stirred and rendered faintly alkaline to litmus, is heated to between 70° and 80° C. After cooling to 45° C. 1 per cent. of trypsin solution (40 c.c. to the four litres) is added, the preparation of trypsin used being Allen and Hanbury's liquor trypsin co. This, in view of the fact that the preliminary heating has destroyed the anti-tryptic power of the meat juices, rapidly breaks down some of the albumins present. The trypsin is allowed to act for from two to three hours, the temperature being kept raised by placing the vessel containing the mixture in an incubator at 37° C. The next process is to precipitate the unaltered albumins and to render the broth easily filtrable, and with this in view the mixture is rendered slightly acid with acetic acid and brought to the boil. The coagulated proteids and other solid matters can now be almost entirely separated by straining through a bag of close-meshed muslin.

After rendering the fluid thus obtained alkaline to litmus, a small quantity of calcium chloride (about 0.5 gm. to the 4 litres) and 0.25 per cent. of sodium chloride are added, and the resulting broth is then autoclaved for an hour at 115° C. so as to precipitate thoroughly any phosphates that may be in solution, filtered through filter paper, and then tubed and sterilised as in the case of ordinary peptone broth. In making agar the agar powder is best added before the phosphates are precipitated, as the prolonged heating brings the agar thoroughly into solution.