

RARE CONDITIONS.

Actinomycosis.

Sporotrichosis.

Squirrel-plague conjunctivitis.

Bilateral lymphoid infiltration of the conjunctiva.

TROPICAL CONDITIONS.

Trachoma dubium.

Chronic gonococcal conjunctivitis.

It is not necessary to describe the clinical manifestations which characterize each of the conditions of conjunctivitis enumerated above. It is only necessary to say that in the absence of infiltration of the normally clear cornea by a cellular exudate, and of the vascularization characteristic of trachoma, the condition under consideration may be determined to be non-trachomatous.

In conclusion I do not wish to give the impression that I minimize the value of ordinary clinical **observation** by an experienced trachomatologist in the diagnosis of conjunctival conditions. In many cases of follicular trachoma, **stage I**, the appearance of the follicles and their position **at each extremity** of the retrotarsal fold of the upper lid is characteristic. However, no such characteristic appearance obtains in **trachoma** when there are no obvious follicles, but merely a wide-spread subepithelial infiltration which makes the conjunctiva red and velvety.

INCIDENCE OF MYOPIA IN CHINA

Data and theses from periodical investigations covering thirty years residence, and association with refracting and hospital centres, in a score of the larger cities

BY

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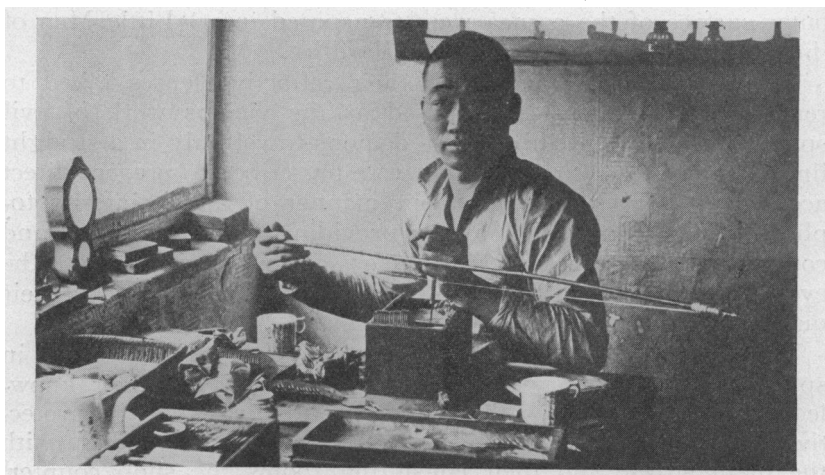
General background.—A sharp distinction had to be made between ancient native refracting methods and **treatment** and the modern school, represented by comparatively recent medical missionary, private Western, and Western-educated Chinese enterprise.

Modern practices began in the last decades of **the 19th Century**, spreading rapidly from 1900 onwards. Ancient **schools** rejected modern ideas within their own craft and in **the past ten years**

have almost disappeared. Therefore modern methods ran parallel with and independent of the ancient, and aided by Western science and cheap mass production have almost ousted them.

State control, centralised organisation, apart from guilds, scientific data and analyses or any attempt to assemble information through official channels have been absent. Professions have not been registered under State licence, owing to the absence of an accredited standard among so many diverse nationalities in the treaty ports, or in the native schools, or schools run for natives by missionaries and others. Practitioners are responsible only to common and statutory laws of a somewhat inconclusive character in relation to medical practice. The present Nanking government is slowly instituting the necessary legislation.

Ancient Native Refraction :—Here again sharp distinction had to be made between superstitious or legendary beliefs and what little there existed of scientific procedure. As with other branches of Chinese "medical practice," legal restrictions against surgery and post-mortems rendered native knowledge of anatomy and physiology almost entirely empirical. Native opticians managed to keep their craft apart from the herbs, lotions and concoctions of the street-corner physicians, but embellished it with quackery of another sort. They never attempted even the Chinese barber's ritual of swabbing out the eyelids with a swab that did service to all customers until it wore out. When their rock crystal lenses gathered from "pure mountain streams," and mounted in frames made of the tortoise that swam in the same cleansing torrents,



Primitive "fiddle-bow" for drilling holes in crystals.

failed to correct, they washed their hands of the matter. And if the pavement doctors' crushed centipedes, snakeskin and crude zinc oxide also failed they sought the incantations of native monks. For a few coppers they could purchase a bright red elaborately designed scroll with written exhortations to the "Dragon God" (cool water) to drive back the "Red Eyes of the South" (inflammation). This was to be rubbed on the lids, then burned in a saucer and the ashes mixed with cold water for use as an eyewash.

The Chinese "Peng Tsao," or *Materia Medica*, contains formulae traceable to Greek influences before the Christian era, and the use of lenses in spectacle form can be traced back across Asia to Arabia and Mesopotamia, doubtless, although this is speculative, arising from the influence of Alhazen in the 10th Century through craftsmen imported into China either by conquest or as servants to various Imperial Households at Peking. The form of lens notation, to be mentioned later, lends credit to this supposition, although there is mention of a metal device for sight correction in the Han Dynasty at the beginning of the Christian era.

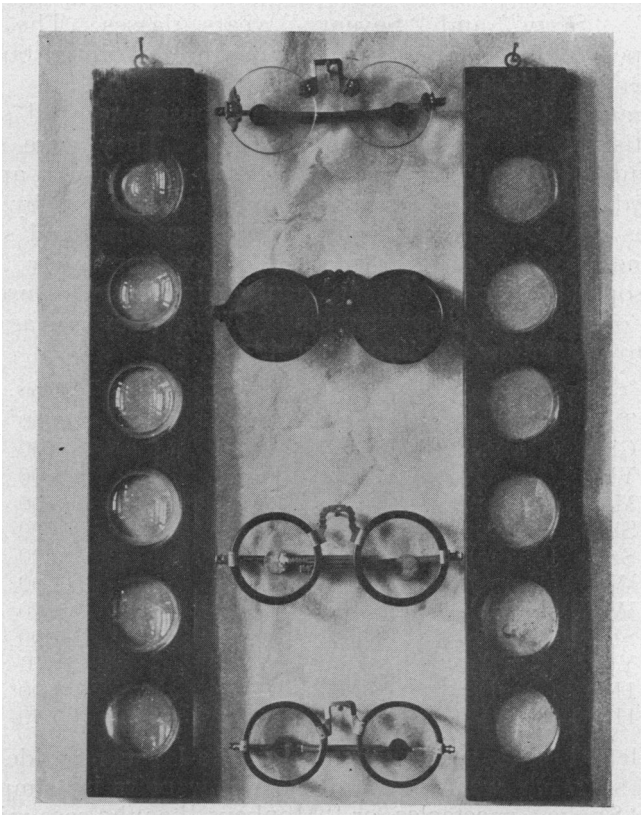
However, in the Chinese manner, imported ideas eventually became overladen with their own superstitions, or "adapted" by minds unable to comprehend exact science of the crudest sort. The result was to formulate about the organ of sight innumerable legends and fancies, with a thread of just enough common sense running throughout to enable practitioners to do a certain amount of good. They had a God of Sight, a God of the Eyes, and a God of Spectacles. Even the miniature images reflected from the outer surface of the cornea were transposed into "Little Men of the Eyes," guardians of sight and health.

Persistent eye trouble which their refractive lenses failed to remedy was frequently diagnosed as the vicious work of evil spirits, and since in China these demons travel only in a straight line, plane and coloured crystals were prescribed to prevent direct access. This was a round-about manner of alleviating photophobia, and minor afflictions, by providing relief from glare and congestion by virtue of the large mass of cool crystal next to the eyes. There was, unknown to them, a streak of science in their quackery.

These opticians were, however, mainly craftsmen and good in spite of their corollary of mystic mumbo-jumbo. Their knowledge was handed down through father to son under the protective Guild system. Their offices were frontless shops flush with the main street, and their consulting rooms the shop counter, where interested shoppers might watch the consultation, and



Ancient lens grinding tools.



Primitive Test-batteries of the ancient school, with four samples of horn and horn and brass frames.

perhaps, offer a little expert advice. The shop walls were decorated with hundreds of spectacles, ready made in pairs of the same strength, with tabs giving notations, very similar unfortunately to the counter-peddling distinguishing some of our own stores.

Nevertheless, behind the simple commercialism ran the thread of adapted science. When nothing in pairs would suit, the optician fell back on a trial-battery of twelve lenses imbedded in two strips of lacquered wood. By covering one of the client's eyes and moving the battery up and down before the other he might find a case of anisometropia, and he might not, much to the client's and spectator's disgust, not to speak of expressed disapprobation. This test was entirely subjective, the "chart" being shop signs up and down the street. If in the case of presbyopes the lower powered lenses in the batteries, which were all concave strengths, were no good, the optician would bring out his four different reading strengths of convex lenses, beginning with his "Lao Kwang" (old sight) correction, which he called the "Forty Years" spectacles. The other three were "Fifty," "Sixty" and "Seventy" years glasses. The test for presbyopes at the reading distance was not a printed book, but the finger print lines.

Notations.—These batteries of minus lenses were all spheres, astigmatism being an unknown quantity. They were surprisingly uniform in cities many hundreds of miles apart, and were graduated, not by any dioptric or focal system, but by animal names as they appear in the first twelve semi-mystical signs of the Chinese zodiac, another adapted device from early Arabian and Mesopotamian contacts. By neutralising batteries used by a score of opticians in different parts of China, they averaged very closely to the following dioptric scale:

<i>Notation.</i>							<i>Dioptries.</i>
Tze	(Rat)	...	...	...	...	...	- 20'00
Chou	(Ox)	...	...	...	...	...	- 16'00
Ying	(Tiger)	...	...	...	...	...	- 14'00
Mao	(Rabbit)	...	...	...	...	...	- 10'00
Shen	(Dragon)	...	...	...	...	...	- 8'00
Sze	(Snake)	...	...	...	...	...	- 6'00
Wu	(Horse)	...	...	...	...	...	- 4'00
Wei	(Sheep)	...	...	...	...	...	- 3'00
Shen	(Monkey)	...	...	...	...	...	- 2'00
Yu	(Cock)	...	...	...	...	...	- 1'50
Hsu	(Dog)	...	...	...	...	...	- 1'00
Hai	(Pig)	...	...	...	...	...	- 0'50

Each lens had its name engraved in the lacquer beside it, and habitual spectacle wearers could order new pairs by simply asking for "Snake" spectacles, or "Monkeys," as the case might be.

Plus lenses for presbyopes or occasional hypermetropes were named as stated above, by their client's years, and were almost uniformly plus 1.00, 2.00, 3.00 and 4.00. Plus lenses were rarely given to young men and women even though their error called for a plus correction. Convex crystals were quite definitely labelled "Lao Kwang," or Old Men's lenses, and tradition is hard to break in China. The writer has had a young man refuse such a correction because he could not dare ape his elders or pose as being so erudite as to use their type of spectacle.

Ancient Sight Records.—The ancients did not keep prescription records, but they knew which grinding tools wore out most frequently, and which lenses they could with advantage, keep ready-made for immediate sale. Chinese are better than most people at generalities, and in making estimates of sales they were again amazingly uniform with those in far away regions. From their combined statistics, gathered under severe questioning, and taken from not only current usage but also from the accumulated experience of past generations, the following percentages were derived:

Myopia	(Concave spheres of all values)	65 per cent.
Presbyopia	(Convex lenses only)	... 20 per cent.
Therapeutical	(Plane and coloured)	... 10 per cent.
Hypermetropia	(Clients under forty)	... 3 per cent.
Sunglare	(Plane and coloured)	... 2 per cent.

The incidence of this high percentage of myopia was emphasised by four factors: 1, that test-batteries contained only minus spheres; 2, that very few children or minors were permitted to wear spectacles; 3, that adults were loath to "lose face" by wearing evidence of a personal defect; and 4, that spectacles were relatively expensive and beyond the reach of poorer classes. Against this must be placed the opposite factor that no record was kept of presbyopic myopes obtaining weaker minus corrections for close work. It is possible, judging from percentages under modern conditions, to be given later, that there were large numbers of astigmatics, antimetropes and strabismus cases uncorrectable by the opticians' spheres.

Modern Sight Corrections.—It is necessary, before proceeding here, to lay the canard that Chinese are fond of wearing spectacles for the sake of appearing erudite. The traditional use of crystals, plane and coloured (called Tea crystals, "Ink," and other names according to natural tint) for alleged mystical and therapeutical purposes has carried over into modern usage. Whatever the diagnosis, these crystals reduced the effect of glare, and even plain white optical glass eliminates from 5 to 10

per cent. of light, a sufficient reduction to benefit them, considering their almost uniformly dark irides.

Percentages under the modern school must be approached from a different angle, although the figures are remarkably similar. Under pressure of Westernization, the people's attitude towards spectacles is rapidly changing. Prices are within the range of the poor, prescriptions are more accurate, and practitioners are more numerous and accessible. Mission hospitals with practically free clinics, notably the Peking Union Medical College (Rockefeller Foundation), Chinese ophthalmologists and opticians trained abroad, and private medical and optical enterprise have combined to raise standards and reach the masses with accurate and low-priced spectacles. Much remains to be done, of course, to eliminate mysticism, peddling and quackery, which still thrive in the remoter inland districts.

The following list was compiled from the records of some twenty-five centres of refraction—in institutions mentioned above—in a score of the principal cities, and covers nearly 120,000 cases:

Correction	Maximum Defect	Average Defect	Percentage
Myopia (simple) ...	32'00	3'00	42'
Myopia and Astig. ...	20'00 and 4'00	2'75 and 1'25	16'
Myopic Astig. ...	4'00	1'00	12'
Presbyopia (convex) ...	4'00	1'75	10'
Hyperopia (simple) ...	5'00	2'00	8'
Hyper. and Astig. ...	6'00 and 3'50	1'75 and 1'00	8'
Hyper. Astig. ...	5'50	'75	4'

The maximum defect is given merely to indicate some of the known extremes in eyes where corrections gave moderately good vision. Greater errors exist but have been beyond the aid of lenses in most instances. Astigmatism is "with the rule" as in normal European practice. Allowance need not be made for presbyopic myopes, as the averages are based on persons and not transactions. Use by children and young students has greatly increased, but parental antipathy is still strong even in the modernised districts.

The records are not a reliable guide to heterophorias and heterotropias. Practitioners, as a rule, have neither the training nor instruments for accurate diagnosis or treatment of imbalance.

In any case, they have been kept so busy meeting the demand for simple sight correction that muscle findings have been neglected, even where understood. As would be expected of a highly myopic condition, exophorias and exotropias are in the majority, although by no means as high as pure theory would suggest. Records of a few, including the writer's, show that exophoria is present in about 5 per cent., a deficiency of from 2 to 5 prism dioptres at infinity being evidenced under the simple Maddox rod. Esophoria exists in about 4 per cent., and surprisingly high deviations have been found in myopic eyes of equal error and visual acuity. Hyper- and Hypo-phorias follow the normal incidence, usually being present in asymmetrical faces.

Progressive, or malignant, myopia is extremely rare, which may be accounted for by the relatively fewer children coming under observation, although its rarity among those who do is remarkable. The almost general practice of fully correcting myopia, rather than partially correcting it, conflicts with certain Western schools; in fact, success attending full corrections is disturbing to established aetiology. Any tendency for myopia to increase after full correction is offset by just as frequent need to prescribe reductions within the first twelve months. This brings one hard up against the problem of inter-relating factors of length of eye-ball, innervation, diet, orbital and cranial indices, which needs far more space than is available here. The greatest extremes of myopia are found in the middle Yangtze valley where errors of over 20 dioptres are frequent.

Practice under both ancient and modern systems seems to indicate that the onset of presbyopia is earlier than in the West by about 4 or 5 years. The native term, "Forty Years," for a plus one lens need not be considered exact, but its approximation is significant and is borne out, further, by changes taking place in the crystallines of Europeans residing in China for any length of time. Two causes contribute to this change; one, the lower nutritive quality of foods, even of those introduced and grown for European consumption; and two, excessive infra-red radiation from relatively prolonged and intensive sunglare. This is further intensified by reflection from the light yellow loess soil and dust and from the surfaces of rivers and water-courses containing fine loess in suspension, which radiation is not reduced by the tinted sunglasses customarily worn—Crookes', Fieuzal, Smoke, Amber. In the main, presbyopic corrections in the majority of cases, Europeans included, call for plus additions of from half to one dioptre in excess of Donders' and other European scales.

Orbital and Cranial Indices.—The almost superstitious rever-

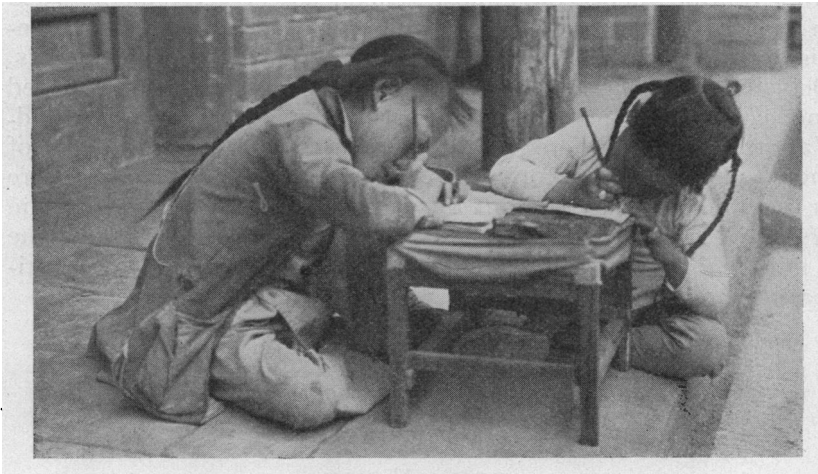
ence for the dead prevents serious research except of a surreptitious nature. The cranial index for 62 male skulls in North China averaged 78, while the upper facial angle (formed with the Frankfort Horizontal by the nasion-prosthion line) in 58 skulls was 83.5 degrees. The Fronto-orbital deviation angles (which the horizontal axis of the orbital entrance forms with the norma frontalis) were in some 60 male skulls, for the right orbit 13.7 and the left, 14.1 degrees. These indices were compiled with the assistance of the late Dr. J. Davidson Black, known as co-discoverer of the fossil, "Peking Man."

Aetiological Note.—Whatever the predisposing causes of this high incidence of myopia, one fact is certain: that it is widespread amongst all classes of Chinese, and, in view of the prevailing illiteracy (as distinct from folklore and handicraft knowledge) among 98 per cent. of the people, that it must have taken many generations to bring about. Apparently, from the figures available, there is no difference in cranial and orbital indices great enough to account for it by abnormal pressure by the external recti; that is, at the normal close work distance of one-third metre. Academic illiteracy does not dispose of use, and abuse, of accommodation and convergence; at least, not among Chinese peasantry, where families are self-contained economic units doing their own spinning, weaving, clothes-making, building and general domestic handicrafts.

Pupillary distance is slightly wider than in similar mesocephalics of the West, the average male being slightly under 62 mm., and frequently as much as 70 in larger heads. Temple lengths average a quarter of an inch longer than European. Diet, although consisting largely of starchy substances—grains, wheat, millet, rice, with a balance of oils from pork fat, beans and vegetables and proteins from other sources, usually domestic fowl, duck and fish—would not account for undue deficiency in eye structure. The known "sub-normal" accommodative power existing simultaneously would tend partially to neutralise this effect. If diet is a cause, it is not so much its type but its chemical content, and shortage of those elements necessary to eye growth, owing to inferior cultivation and the nature of soil and water, which in the flat coastal and Yangtze valley plains contains high percentages of alkalies and limes in various districts.

The chief cause, in the writer's opinion, is the form of education which has existed for two thousand years, intensified by gross abuse of the accommodative-convergence faculty. The only form of learning was by written and printed characters in books, elaborated and standardized by state examinations for the civil service. Thousands of character-hieroglyphics had to be read,

memorised and later reproduced by candidates locked in cells in the ancient Examination Halls. From the beginning of this monumental sight and memory task, children were permitted to crouch forward over much-thumbed books of coarse yellow paper covered with almost indecipherable smudges. The writer has seen several of these ancient schools, packed closely at primitive desks in a foul atmosphere, with children between the ages of 4 and 16, chins resting on fists, which in turn rested on the low desk, their books a few inches from their eyes. Looking at the



Typical habits of children at studies. The "ancient" teachers made no effort to correct the practice.

class from the teacher's desk, only the tops of their heads were visible, as they droned a monotonous chant to aid their memorization. They are now, happily, almost entirely superseded by modern classrooms.

Schoolrooms, like their houses, were poorly illuminated; two small windows, with less than one square foot to fifty of floor space, being most common. It took the writer, in most instances a few minutes to get accustomed to the poor light after going inside. It is not improbable that the abnormal accommodative-convergence distance and angles forced on the children by these pernicious habits of constant over-innervation would account partly for the low incidence of exo-phorias and -tropias. In young eyes, with plenty of reserve accommodation, the effect on the crystalline would be less than the cramp on the internal recti, thus establishing in due course a false relation between accommodation and convergence.

An important proof of the writer's thesis is the fact that, under modern conditions, where often two and three generations have been schooled by mission or Chinese enterprise, the children requiring lenses reveal a marked diminishing of myopia and a relative increase of hypermetropia.

Diseases.—Briefly, trachoma is most general of the more malignant types, whole villages in North China being afflicted. Corneal ulcers, especially rodent, catarrhal and serpent, have left their scars and trail of blindness on innumerable eyes. Practitioners usually make a point of examining for cicatrices before other routine; hence the almost general use of keratomers. Next in severity are sarcoma, orbital tumours, various forms of retinitis and the almost endemic catarrhal and purulent conjunctivitis. Detachment of the retina is not so common as might be expected and cataract has no more than normal incidence except in mid-Yangtze valley, where conditions approach those in parts of India. Ptosis, keratoconus, and other afflictions occur in more or less normal degree, but glaucoma is extremely rare. The first two causes, trachoma and ulcers, account for most of the 3 million blind in both eyes, and 5 million in one eye, as estimated a few years ago.

THE PRINCIPLES OF ORTHOPTIC TRAINING

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PURPOSE.

It is well known that a patient who squints has monocular vision and it is our aim to give him binocular vision. It is realised that the squinter uses only one eye: what is happening to the vision of the other? It is obviously being suppressed unless there is diplopia present. The squint may be either an alternating strabismus, in which case the visual acuity of each eye would be equal, or it may be unilateral. A patient with a unilateral strabismus may or may not have an amblyopic eye. If there were no amblyopia present, it might be necessary partially to occlude the good eye, until the deviating eye was able to fix at will. If there were amblyopia present, the good eye would be either totally or partially occluded, until the patient was able to alternate.

The first stage is to teach the patient to obtain simultaneous perception, that is to say, to see an object with both eyes at the same time, and in order to do this, unless the visual axes are