in an elevated region than here, on account of the great amount of sunshine. In other words, the atmosphere is largely germ-proof and free from germs, and this, of itself, must have a profound effect upon a tubercular patient. The same conditions render bacteria, other than the bacillus of tuberculosis, prevalent to only a slight extent, or absent. One of the great dangers of tuberculosis is the multiple infection by the staphylococcus, etc., and not simply by the tubercle bacilli.

With reference to the increase in the number of red blood-corpuscles and hemoglobin, I would like to ask Dr. Klebs, or the reader of the paper, whether the method of Hammerschlag, of estimating the hemoglobin and iron contained in the blood by taking its specific gravity, and Daland's method of estimating the number of red blood-corpuscles are not preferable to the use of Fleischl's apparatus and the Thoma-Zeiss cell. I am inclined to think that the trend of opinion is toward laying stress upon the specific gravity of the blood rather than to depend upon the color tests for the amount of hemoglobin it contains. If its specific gravity is known, a simple calculation will give the amount of hemoglobin and the amount of iron.

In conclusion, I heartily agree with much of what Dr. Waxham has said, but I can not concur in the subtle current running through his paper that climate is, unreservedly, the only and best remedy we have in tuberculosis, because it is not applicable to a large proportion of our tubercular population. It may be a perfectly legitimate opinion for a member of the medical profession to have, but, in my opinion, it is an unfortunate belief for the lay portion of our community to have that the only safety for their tubercular relatives and friends is in fleeing to high altitudes.

Dr. JOHN A. ROBISON—I wish to relate one experience that I have had in sending patients to a high altitude and its effect upon the hematopoietic processes. I had under my care two young women with predisposition to tuberculosis. About two years ago one became profoundly anemic, and there was a slight tubercular deposit in the right apex. I sent her to Mont Claire Sanitarium at Manitou. She remained there all winter and the following spring, and since returning to Chicago has been in perfect health. I never saw such a transformation, with the exception of that in her sister. When she went to Manitou she was chlorotic, her lips were almost bloodless. When she returned she had rosy cheeks, had gained in flesh, the tubercular deposit had apparently cleared up and she has been in perfect health since.

Last winter her sister became chlorotic, but there was no deposit in the lungs, and I sent her to Manitou. She returned in the course of a few months, having gained fourteen pounds. Her cheeks were rosy, her lips red, and she has retained her health ever since. These are two examples which show that the change of climate from Chicago to Colorado quickened all the blood making processes, and it did not require a blood-count to demonstrate it.

I was glad to hear Dr. Waxham insist upon patients making their plans, when they go to Colorado, New Mexico or Arizona, to live there. This is an important point. When Dr. Solly delivered an address in this room, I asked him the question, whether a tubercular patient in moving to Colorado should not remain there, and I was much surprised to hear him say, "no; not necessarily." He said that after they had been there for two or three years they could go East.

I wish to ask Dr. Waxham a question in regard to Phoenix. For a number of years this place has had a great reputation, but is it not true that it is somewhat on the wane on account of the fogs due to irrigation, and lack of hotel accommodations and good boarding-houses? I would also like to ask him whether he knows anything about the town of Eddy in the Pecos Valley, for consumptives?

Dr. LISTON H. MONTGOMERY—In the two cases cited, that were sent to Manitou, what therapeutic measures, if any, did you use?

Dr. ROBISON—I treated the first case several months; gave her the usual remedies for anemia, without any notable results. When they went to Manitou neither of them took any medicine.

Dr. WAXHAM (closing the discussion)—With all due respect for Dr. Klebs' opinion, I must heartily agree with Dr. Favill with reference to the advantages of climatic treatment of tuberculosis. I believe it is the only treatment that promises the hope and expectation of almost certain recovery in incipient cases. I have seen so many patients recover as a result of a suitable change of climate that I am convinced of its great utility. It is not only altitude, but it is sunshine and warmth which enable patients to live out doors in certain climates, where they can not in others. For example, I was surprised this morning to learn that there had been but four sunny days in Chicago during the month of March. In this climate tubercular patients can not get the advantage of much sun-

shine or much out-door life, which they could get if they were in New Mexico, for during this season of the year they could sit out-doors all day long and drink in the sunshine from morning till night. I think I made it clear in my paper that I did not advise all patients to flee from this climate, for we all know that a great majority of patients, as Dr. Wells has pointed out, can not take advantage of a change of climate, and I urge against sending patients away who are unable to financially provide themselves with every means of comfort. I have frequently emphasized the importance of not sending such people away from home.

In answer to Dr. Robison's question with reference to Phoenix, I do believe that Phoenix is not considered with as much favor now as formerly. Indeed, most of my patients have done poorly at Phoenix, and I have been at a loss to account for it, unless it has been that they have but little altitude, only 1100 feet. In Phoenix it is warm and mild, and there is a great deal of irrigation and poor drainage. In addition to that, the accommodations are rather poor. I believe that Tucson is very much better located; it has an altitude of about 2500 feet. Oracle, I consider one of the best places in all the Southwest; it is thirty-eight miles from Tucson, has an altitude of 4500 feet, is protected from the winds by the surrounding mountains, and the climate is almost perfect. The only disadvantage is a long ride of thirty-eight miles from Tucson. Las Cruces is almost equal to Oracle. It is especially suitable for tubercular cases that can not stand a very high altitude. It has an altitude of 3600 feet; the climate is superior to that of Phoenix. In regard to Eddy, located in the Pecos Valley, the climate corresponds almost identically with that of Las Cruces, excepting that it has less altitude. There is the same large amount of sunshine, same warmth and mildness, and, in short, the climatic conditions are very similar.

MODERN ANATOMY.*

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There are three fallacies in our present method of teaching: 1, a large public clinic for so-called practical clinical instruction; 2, a main reliance upon didactic methods in all branches; 3, an old-style dissecting-room.

The time was when the didactic lecture, reviewing and condensing, was absolutely necessary; the lecturer had to do the weeding, culling the essentials for presentation to the class. As a result, the museum preparations, apparatus, illustrative charts and other means of instruction were confined closely to the shelves as adjuncts to the didactic methods only; attendance upon which, and a knowledge of which were the sole requirements for graduation. The professor himself (*Deus in machina*), dignified and learned, the sole authority upon his branch, came out from the seclusion of his study at the lecture hour to speak the winged word to his class, and as solemnly returned to his isolation. Well educated, he was supreme; cultivated, he was far above his surroundings, for had he not been to Liverpool and Berlin and studied anatomy in Edinburgh, Vienna and Paris.

The medical student, on the other hand, was too often without literary training, uncouth, unobservant and somewhat prone to dissipate; the profession was not a science, the practitioner but a pill-driver. Under such conditions the didactic method flourished and grew to its present preeminence.

In the progress of time learning has permeated the community; in the republic of letters, the doctrines of liberty, equality and fraternity have broken down the old barriers, have educated and refined the medical student, have made him a fit companion in study, and have changed him from a mere receptacle for other men's words into an investigator of facts for

*Read before the Philadelphia County Medical Society, March 8, 1899.

himself. The avenues of thought are now wide open to him, the sources of knowledge easy of access, foreign travel an every-day event; in fact, the whole face of our profession is changed, the student is now a confrère, not a subordinate or inferior, so that it may be safely affirmed that the man who is too good to associate with his pupils is not good enough to be a teacher.

I think it will be generally acknowledged that while anatomy is the basis of the whole medical fabric, and is also the most difficult in the whole curriculum, it receives the least practical attention, and is the one upon which our students stumble most seriously before our State boards; the one about which the average practitioner is most ignorant, and the want of knowledge of which is the cause of the greater part of our errors in practice. The time has come when this defect must be corrected; when the student must be not merely a memorizer, but an auto-investigator; the instructor not a demigod, but a coworker fitted to conduct as well as to instruct; when the lecture must be made not the principal factor, but an adjunct subsidiary to the practical laboratory; the museum, with its long array of wet and dry specimens and models, must be in the dissecting-room rather than in the lecture hall, easy of access for personal examination to illuminate the students' daily work rather than merely to illustrate the lecture. The didactic lecture is still necessary to a limited extent as a directory for the explanation of those parts not accessible to the knife of the ordinary student or explanatory of such parts, such as the obturator muscle or the supinator brevis, which have been found of peculiar difficulty, or for the purpose of grouping the knowledge otherwise gained in dissected fragments.

In the short time of two terms of five months each the medical schools could do little more than condense the main facts, jam them into their hearers for future digestion and application, the main channel of instruction being the ear.

The dissecting-room of the period was large, dirty, ill-smelling and inaccessible, where students assembled, a few, in earnest, for faithful study, the others, careless, for perfunctory dissection without supervision and without profit, many graduating without dissecting at all; the cadavers ill-preserved, water-logged in pickle or tanned in alcohol. The room was in charge of a single demonstrator, who, be he ever so willing, was overwhelmed by the methods in vogue, by a want of recognition from the higher authorities and by the lack of facilities for instruction. We thus see that in the curriculum of twenty years ago the learned professor, the didactic lecture, the corps of instructors, a few other corpses, and (in)voluntary dissection were the armamentarium.

Under the modern method the dissecting-room should be clean, accessible, under strict supervision, open during certain hours only for earnest individual work; the daily task outlined upon the blackboard, presupposing two hours' study *at home* the evening before, in preparation for the following day's dissection, not with a single man, but with a large corps of competent assistants, all in attendance throughout the assigned hours of dissection, material in abundance, the bodies well preserved and thoroughly cleaned.

Before the novice is allowed to dissect he should go into the bone-room for a course of osteology. The work of the day should be shown him upon a previously dissected subject, for the old idea that you can

learn anatomy only by your personal dissection is in a sense wrong, if your own dissection is of such a slovenly character as not clearly to exhibit the structures involved, and, unfortunately, though the student can only properly learn anatomy by dissection, yet he can only dissect to advantage when he knows something of anatomy before he dissects. This apparent paradox can be overcome in the way indicated: 1, by the previously assigned task; 2, by the work of the day being shown him upon a dissected subject; and in addition, 3, that wet specimens be kept in tanks readily accessible, which shall be constantly referred to for information as the part is worked out; because it is of infinite advantage that he should not make a single cut without a fixed and definite idea of what he is doing. A caution should be observed here in regard to too much demonstration. The student, under strict supervision, must do his own work with his own hands, and if the dissection is not satisfactory in its manual technic, it must be repeated; the whole subject to that infernal nuisance, an examination, at the end of each dissection. The writer has thus given over a thousand such examinations annually for the past seven years.

The dissection of the whole body during each of the first and second years, a re-dissection for applied anatomy during the third year should be the minimum of requirement; with additional facilities for voluntary review by means of wet specimens and models during the fourth year; to say nothing of the opportunities that should be offered to our alumni to freshen up fading memories, to prepare themselves for difficult operations or to devise new ones.

As the theory of the student-idea has changed from a passive receptivity to that of active personal research, the preliminary training must advance, *pari passu*, as the instruction becomes more personal and more practical, actual observation taking the place of didactics, the training of the eye and the hand in addition to the ear, a tremendous burden is thrown upon the medical school, and just so far as the laboratory individualism takes the place of the long-range teaching the difficulty is proportionately increased. The medical school can no longer assume responsibility for any training properly preliminary; it is even a question if it has the time for very advanced technic, certainly it has little for the breeding of specialists. The training of the mind, so much harped upon, should be done in the pre-medical days, and specialism should be given only to post-graduates and not to them till the foundations for it have been well established by at least five years of general practice.

In the days when you and I graduated, comparative anatomy, embryology and histology were but briefly touched upon; to-day they are absolute essentials. In the last two years of a college course these might well supplant the higher mathematics and the mere reading of the ancient classics, which are of less importance than the analytic study of the freshman and sophomore years; in fact, in our own university as well as at Princeton and other institutions of like grade, the courses of biologic study are already offered to the expectant medical matriculant, and almost all of the current work of the first-year medical in embryology, histology, and in addition, comparative anatomy, can readily be traversed. The teaching in these must also be not didactic but in the laboratory, although the teachers need not necessarily be medical graduates.

Where the preliminary training is not higher than a high school, greater difficulties present themselves, which, however, might be met, in part at least, in cities such as ours, by the public scholarships being applied to obtaining preliminary biologic courses rather than to immediate entrance into the medical course, for I believe it is more important for the student entering upon a medical career to be grounded upon these three preliminaries—histology, embryology and comparative anatomy—than upon some of the groups which are classed under the “humanities.”

For the student who has not had a full four years' college training, I have sympathy, for I feel there is a place in the profession for the self-made man of great common-sense and earnest purpose, and though a college man myself, I am not so blindly wedded to the college idea that I would at present admit only those thus educated, for though I believe more and more the successful medical man of the future must be well trained, yet really the best-trained physician is the one endowed with common-sense, who knows his facts and can apply them, whether he be a genius born, a self-made man trained in the school of hard experience, or the bookworm product of the college; to say nothing of the tact which is sometimes inborn and sometimes acquired by the hard knocks of personal contact; for be it always remembered that the world at large cares nothing for your theories, and wants not necessarily well-educated men, but practically successful physicians. Nevertheless, with equal brain, with equal tact, with equal common-sense, the non-college man is tremendously handicapped in a contest with his better educated brother.

We may here digress a moment to make a somewhat “techy” suggestion that increased requirements for the student demand increased requirements in the teaching staff, and too high a standard of excellence will demand a higher grade of intellectuality and attainment than has heretofore been exhibited by too many of the medical faculties throughout our country. This is one of the obstacles, too little recognized, which has prevented the profession of medicine from being placed upon a higher plane. Be sure no stream can rise higher than its source.

Many of you may be surprised at my advocacy of the teaching of histology, comparative anatomy and embryology in the college course preliminary to medicine, but from careful observation I am convinced of the wisdom of this, otherwise the student, on the one hand, overcrowded in his medical curriculum, or the teacher, on the other hand, in his enthusiasm loses sight of the true aim, and makes these branches the ultimate end, instead of using them to teach, or illustrate the teaching of, human anatomy. The result is the same, the human anatomy is pushed into the background. The human machine is so intricate that it is not too much to ask that the student should come to its study with his preliminary training complete, while the medical school itself should devote its energies to human anatomy, descriptive and applied, and these collaterals should be entirely subsidiary. I once went into the refrigerator of a medical school, where the shelves were crowded with the remains of cats, monkeys and cobras in decent order, but the human bodies, dirty, were flung ignominiously and indiscriminately upon the floor, and I said to myself, that is what human anatomy apparently is coming to, so long as our schools endeavor to cover so wide a range.

In the majority of our schools the student is expected to learn the whole of his anatomy by dissecting each part once only. What would you think of an engineer who would expect to know the mechanism of a locomotive by taking it apart and putting it together once, with some didactic lectures thrown in, or a watchmaker who had seen that intricate machinery only once; yet this is what we practically expect of our medical men.

There is another matter that I would like to emphasize to you in which those of you outside of the medical school can aid the teachers in the medical school, and that is by directing the students who come under your care before they come to us. The greatest error, both in our colleges and among practitioners, is the stress laid upon the knowledge of the names of the arteries rather than their position; you learned them by heart, great strings of names like ropes of onions, and you have forgotten every one of them; you could not have passed an examination upon them six months after. We don't fear to cut an artery because it has a name; we don't cut them because it adds to the shock, and the blood is a nidus for sepsis and, moreover, it is unnecessary; but if you do cut one, bless its name, clamp it with a hemostat. Agnew used to say of the man who would not compress a carotid artery with his thumb until a ligature could be applied, that it was doubtful if Providence intended him to be a surgeon; but you must know, not its name, but where it is, and, properly studied, you will remember its position after its name has long been forgotten. No, the names of the arteries are not the main things, but the main things are the bone and the muscle, and the wide expanse of fasciæ so much neglected; when these are learned, the arteries coursing in the valleys between muscular or bony projections, as points of reference, become comparatively simple, and perhaps the names, too, may stay with you. “Grind” your student upon bones, muscles and fasciæ only, but repeatedly, *ad nauseam*, before you send him to us, then we will give him a dissected subject, letting him take the muscles off and restoring them to place until he has mastered the interrelation of these structures, but we will not allow him to desecrate the human form divine with the slashing knife of an ignoramus; and perhaps later, when we get civilized, we will write our best anatomic thought in a book and let some freshman read it to his classmates as a didactic lecture, and, after your student is thoroughly instructed in the elementaries by the junior we will send him to the professor, who being deservedly high-priced should not be condemned to do drudgery, but being freed from routine has prepared himself by original research to open the way to the higher knowledge of our magnificent science.

I have always thought it a disgrace to our profession and to this community that the immortal Leidy should have been compelled, for the sake of a livelihood, to waste his magnificent powers in drilling elementary facts into unappreciative novices. Yea! even until he had to sit down in the lecture, and quickly passed from the examination-room to his death-bed.

To conclude then:

1. Modern anatomic education requires the highest intellectual training as a preliminary, in which histology, embryology and comparative anatomy should form an important part. With our modern methods of precision in diagnosis and practice, a knowledge

of the facts of anatomy was never so important, yet in our medical schools human anatomy has been pushed aside by the less important ologies and isms. The teaching of the medical school should be mainly upon human anatomy and should be mostly upon cadavers, with didactic lectures only as an adjunct, the stock drilling and teaching being by younger men, who should have decent remuneration, while the professor, freed from the exhaustion of elementary work, should have time to devote himself to original research and to the instruction in the higher elements of his art. It might be well to impress on you in this connection that the scope of this branch has enlarged so tremendously that the tendency is to lead its teachers not as formerly into practice or surgery, but into the fields of scientific research.

2. Our profession are lamentably weak in their knowledge of this branch, far weaker than they would dare to confess to the general public, or perhaps even to each other—and this not because they have forgotten, but because they never knew it; they were never properly taught it, they were never given sufficient facilities for study or review, were never sufficiently impressed with its importance, and because they were taught by hearing and not by touch, by faith and not by sight.

3. The instruction should be practical and communicated not only through the ear, but also by the eye and by the hand.

4. For those of us who are engaged in the teaching of this engrossing branch of medicine, let me urge you never to forget that the majority of those committed to our care must necessarily be practitioners not scientists, and that in schools like ours, devoted to the evolution of the every-day physician, your facts must be broad, major, practical, rather than minute, scientific or theoretic.

5. Lastly, as loyal Philadelphians, let us realize the intense competition of rival schools in neighboring cities, which will in the next few years test our mettle in the race for supremacy, particularly in the facilities they will offer, in men and methods, for the scientific and practical study of modern anatomy.

ONE-SIDED AMBLYOPIA.*

ITS DIAGNOSTIC SIGNIFICANCE WHEN WITHOUT
OPHTHALMOSCOPIC LESIONS.

BY H. GRADLE, M.D.

CHICAGO.

It is often a difficult problem to determine the cause of a one-sided reduction of sight not dependent upon intraocular disease.

In order to illustrate these difficulties, I wish to present the histories of some obscure cases and view them in the light of more decisive observations in my experience. The first inquiry in such cases must be whether the dimness observed by the patient is really a recent or progressive failure of sight and not a stationary old amblyopia, as is often found in strabismic eyes or less often in the more ametropic eye of inanisometropia, even if no squint exists. Not uncommonly a patient does not know that one eye is inferior to the other until tested by the oculist. On the other hand, I can recall at least one instance where a young man became alarmed because he had recently learned by shutting one eye that his other eye was

poor—there being $V=20/100$ in consequence of a high degree of hypermetropia, which remained unchanged under an observation of some months. Before placing a case in the category to be now discussed, it is also necessary to exclude certain delicate and not fully understood changes in the center of the retina, which sometimes require pupillary dilatation and considerable skill in the use of the ophthalmoscope for their recognition.

One-sided failure of sight without intraocular disease is either due to a lesion of the optic nerve between chiasm and eyeball or is functional, in other words, of psychic origin. The latter condition has been observed relatively often in hysteric patients. I will not quote the extensive literature on this subject, but refer for details to the "Traite de L'Hysterie" by Giles de La Touréte (1891, Part i, chapters 8 and 9). The typical cases occur in distinctly hysteric subjects and vary from dimness of sight to absolute blindness. As a rule the patient is not annoyed by this condition, if one-sided, perhaps not even conscious of it. The field of vision is almost always concentrically restricted for white and for colors, though to a variable extent in different cases, and as a rule the color-fields are reversed, i. e., the limit for blue is narrower than that for red. The field is often limited in both eyes, although central vision may only be reduced in one. In no case of this description in literature or in my experience was there any interference with the reaction of the pupil to light even in an alleged blind eye. There is no tenderness in the orbit except when suggested to the patient by a traumatic history. The diagnosis is suggested by finding hysteric stigmata, and made certain when anesthesia of the lids or conjunctiva can be demonstrated. In doubtful cases it can be made absolute only by removing the blindness by purely psychic influences, no matter how long it may have existed. I will report two instances of moderate amblyopia in which the diagnosis was not at once suggested by the history.

Case 1.—Mr. H., a laborer, aged 51 years, wanted an examination for pension purposes. He claims to have had a fall from a stage-coach, twenty-six years ago, and that ever since then his right eye was of little use to him. It is not quite clear whether or not there was formerly diplopia. For a few years he claims to have increasing dimness of the right eye. The left eye is objectively normal in every way. The right eye shows absolute paralysis of the superior rectus and of the sphincter muscle of the iris; no intraocular anomaly and approximate E. $V=20/80$ improved by convex 1D to 20/50, but still he calls his sight dim. Reading with +3.5 is difficult but possible. His left eye has more than 20/30V. But the field, much restricted in the right eye—especially on the temporal side, where it only reaches twenty degrees—is also concentrically restricted in his left eye, which he considers normal. The limits for colors in the horizontal meridian are (in degrees):

		Green.	Red.	Blue.	
R. E.	{ Outward	5	8	5	} Blue appears green to the R. E.
	{ Inward	5	10	5	
L. E.	{ Outward	45	50	15	
	{ Inward	12	22	10	

While the peculiar reversed and restricted color-fields of both eyes, with the ophthalmoscopic integrity, in spite of the long persistence of the dimness, suggested hysteric amblyopia engrafted upon an organic lesion of fibers of the third nerve, perhaps of traumatic origin, the diagnosis was made positive by finding an incomplete anesthesia to touch and to pain on the right side of the whole face, including the lids and surface of the eye, of which anesthesia the man had not been aware. There was also diminution of smell and taste on the right side.

Case 2.—Mr. R., a salesman, 35 years old, claims that his

*Read before the Chicago Ophthalmological Society, March, 12, 1899.