of water, and receives in the normal condition the rays of light through air, I thought I might make my subaqueous lens of the same media. A couple of watch-glasses, placed with their concavities towards one another, so as to enclose a convex lenticular portion of air, when immersed in water, disperse the rays of light and diminish the size of objects seen through them, because they force the more refractive medium, the water, to assume a *concave* shape in relation to the air between the glasses. The same watch-glasses placed with their convex surfaces towards one-another, and connected round their edges by a water-tight rim, thus enclosing a concave lenticular portion of air, when immersed in water, refract the rays of light convergently to a focus and magnify objects, because they force the more refractive medium to assume a *convex* shape in relation to the air between the glasses. Their magnifying power or focal distance under water is somewhat less than that of the same glasses in the reversed position and filled with water is in air; the slight difference being owing to the greater refractive power of the glass in air than in water. I found that two glasses of a curvature of about $1\frac{1}{4}$ inch radius thus placed formed in water a lens having a focus of about two inches. This *air-lens*, as it may be called, completely supplies the loss of our anterior lens in water, and restores perfect vision. Of course the same magnifying power may be obtained by various combinations of differently curved glasses, or by plano-concave or concavo-convex air-lenses. The advantages of this kind of lens for subaqueous vision over a glass lens are obvious. It can be made of any required size so as to command a large lateral field of vision. It ceases to act as a lens the instant it emerges from the water, and does not interfere with vision in the air, as then we merely look through two thin pieces of glass with some air between them. There is no provoking loss of refractive power, as in the case of the glass lens; and lastly, it can be made very cheaply. With either form of lens we can see from below the water objects in the air above us quite distinctly if the surface of the water is smooth, less distinctly if it is agitated.

Air lenses constructed on the principle described may be made of any magnifying power, and are much better adapted for the microscopic examination of objects under water than glass lenses, whose refracting and magnifying power is reduced to one-fourth by immersion. Thus a glass lens of a quarter-inch focus in air, would scarcely be equal in water to an air lens of one inch focus.

I have said that the difference between the refractive power of a glass lens in air and water is as 4 to 1, or even more. The difference is about the same in the case of the crystalline. Thus, the spherical lens of a cod, which has a focus of about $\frac{5}{20}$ of an inch in air, has a focus of about $\frac{3}{5}$ of an inch in water, which is about the distance of its posterior surface from the retina in the fish. Supposing the focal distance of the human crystalline to be, in air, $\frac{1}{5}$ of an inch, it will be more than $\frac{2}{3}$ of an inch in the fluid in which it floats. But, in front of it, we find what I have called the anterior lens—I mean the aqueous humour—with a focus, as I have proved, of about 2 inches. If we take two lenses respectively of 2 inches and $\frac{2}{3}$ of an inch focus, and place the weaker over the stronger, we shall find their united focal distance to be about $\frac{1}{2}$ an inch, or about the distance between the back of the human crystalline and the retina. My measurements, in the absence of appropriate instruments, lay no claim to exactness; they are, however, a sufficient approximation to truth for my present purpose.

How is it that after the operation of extraction of the crystalline lens, which has a focus of less than 1 inch in its natural position, the patient can see distinctly with a lens of from 3 to 4 inches focus? The reason seems to be that the optical character of the eye is completely altered by the operation. The space formerly occupied by the crystalline is now filled with aqueous and vitreous humour, and the eye represents a sphere of water, bulging in front into a more convex form by means of the cornea, which will have the effect of a superimposed meniscus of about 2 or $2\frac{1}{2}$ inches focus. A thin glass sphere filled with water of 1 inch diameter will roughly represent the eye deprived of its crystalline. We find the focus of this sphere to be about $\frac{1}{2}$ an inch. Let us place in front of it a lens of $2\frac{1}{2}$ inches focus to represent the bulging cornea, and we find the focal distance diminished by more than one-half. Another lens of 3 to 4 inches focus will bring this focus close to the posterior surface of the sphere, in fact, to the situation of the retina in the actual eye. This explains what happens in the eye deprived of its crystalline. Such an eye will require a much more powerful lens for subaqueous vision than that above described.

Montagu Square R. E. DUDGEON, M.D.

Dr. Lankester and the Scarlet Fever Epidemic

PERMIT me to make a few remarks on some notices of my paper on scarlet fever, published in your pages on the 17th of November last. Referring to my recommendation as to the destruction of the poison of scarlet fever, the *Pall Mall Gazette* says—"All this is very well in its way, and may be carried out by the upper and middle classes, among whom the mortality from scarlet fever is comparatively small; but the plan is quite out of the reach of poor creatures who have but one room, one bed, and one suit of clothing, which even at night takes the place of blankets." My object in writing the paper was to show that scarlet fever might be averted by certain measures, and I left it to those who read it to devise the means of making them available for all. When the cattle disease broke out, an Act of Parliament was passed for the purpose of diverting it. The lives of human beings are surely of not less value even in a money point of view than those of cows and oxen, and I have the conviction that certain measures might be adopted by the Government that would reach even the "poor creatures" to whom the *Pall Mall Gazette* alludes. Even now there exist Acts of Parliament which, if at once put in force by boards of guardians, town councils, vestries, and other local authorities, would at once enable them to put down this disease. The inhabitants in "one room, one bed, and one suit of clothing," are reached by medical men, and they might be empowered to remove the sick from the healthy, to destroy useless infected clothing, to have the infected linen washed, and generally to see that the disease is arrested. What can be done amongst the rich ought to be done amongst the poor, and expense ought not to be allowed to stand in the way of such merciful measures. It should be remembered that such outlay on the part of wealthy ratepayers would, in the end, repay them, as they catch this disease from its being fomented among the poor, and they would no longer be liable to these attacks when their less opulent neighbours were free from them.

In the pages of the *Lancet* "A General Practitioner" states that I have reflected on the members of the medical profession in stating that they do not exert themselves to suppress this disease. I spoke from a rather extensive experience on this subject, and regret to say that I have nothing to withdraw on this point. I did not say it was the fault of medical men. I said they were not instructed. This is the fault of a system of medical education in which public health is not contemplated as a part of its course. It is true that within the last two or three years chairs of Hygiene have been established at University and King's Colleges, London, but these are exceptional. So deficient is the education of medical men on this very point, that the Government felt itself justified in opening a special medical school at Netley for the purpose of supplementing the defects of our ordinary medical schools. It is from the Chair of Hygiene at the Military Hospital that the most admirable work on Hygiene in our language, by Dr. Parks, has issued.

"A General Practitioner" could not suppose that I was ignorant of the fact that all that has been done for our knowledge of the nature of contagious diseases had been done by medical men, and that our medical officers of health have especially exerted themselves in endeavouring to prevent the spread of contagion. I must, however, again express my surprise at the small amount of information that can be gained from the text-books on the practice of medicine as to how best to prevent the spread of contagious diseases.

I will not in your pages do more than allude to the offensive tone and expressions of "A General Practitioner," but I may add that no amount of "support" I may have had or may expect to derive from members of my profession, will ever induce me to refrain from speaking the truth of them in the interests of the public. I am, however, fully convinced that it is only by such a course that I can hope to retain the respect and continued "support" of the more intelligent and honourable members of my profession. EDWIN LANKESTER

Professor Tait on Bain's Logic

IN your last week's number, Prof. Tait publishes a portion of his Introductory Lecture to his class, in which he criticises certain passages in my work on Logic, having reference to the doctrine of the Conservation of Force. Although I do not, in every instance, admit the justice of the strong condemnatory phrases used in the criticism, I am aware of having committed