On the matter of the use of the medical assessor, the author is a strong advocate of freer facilities being given to either party to a suit to have a medical assessor sitting with the judge. The book will no doubt be serviceable as an elementary treatise on the subject with which it deals.

NOTES ON BOOKS.

IN a leather-clad volume of vest-pocket size entitled *Prescribers' Formulary and Index of Pharmacy*¹ Mr. T. P. BEDDOES of the London Skin Hospital has endeavoured to supply the information that a prescriber is likely to need and to obviate any uncertainty as to what drugs any ordinary pharmacist is likely to have in stock. The matter, which is well arranged, falls into four parts, internal, regional, and external treatment, and synthetic preparations, definite prescriptions of proved value in addition to doses of individual drugs being supplied. It is a favourable specimen of volumes of this order.

A sixth edition has been published of Miss OXFORD'S *Handbook of Nursing*.² The matter throughout has been carefully revised by, among others, certain members of the staff of Guy's Hospital. It is as an offspring of the training of that institution that the book may be regarded, since its foundations are more or less extensive notes of the lectures on nursing, surgery, and medicine, delivered to probationers thereat. Although the book is very readable as a whole, the information supplied is at times distinctly sketchy and not very systematically arranged.

¹ *Prescribers' Formulary and Index of Pharmacy*. By Thomas Pugh Beddoes, M.B., B.C.Camb., F.R.C.S.Eng. London: Baillière, Tindall, and Cox. 1912. (Pott 16mo, pp. 144. 2s. 6d. net.)

² *A Handbook of Nursing*. By M. N. Oxford, of Guy's Hospital. Sixth edition. London: Methuen and Co. 1912. (Cr. 8vo, pp. 327. 3s. 6d. net.)

MEDICAL AND SURGICAL APPLIANCES.

Continuous Drop Bottle for the Administration of Ether by the Open Method.

MR. L. ERNEST ACOMB, M.R.C.S.Eng., L.R.C.P.Lond., D.P.H.Oxon. (Honorary Anaesthetist, Newport and County Hospital), has devised a drop bottle to meet the essentials of a good bottle, which are, he considers :

- (a) That when not in use there should be no escape of ether ;
(b) that it should be able to be carried in a bag without leaking ;

- (c) that it should give a continuous drop of the required size at equal intervals, these intervals being made longer or shorter at the will of the anaesthetist ; and (d) that the bottle should be large enough to obviate frequent refilling, and should be of a convenient shape.

The bottle, of glass, is of a capacity of about seven ounces, is conical in shape, has a wide base, has no shoulder, so that the ether is entirely used up, and the ether surface always covers the outlet. A metal collar is firmly fitted to the neck of the bottle, over which the upper portion is screwed. The upper portion consists of a solid bulb having two channels in it, (a) the ether outlet, which projects beyond the bulb as a small tube, and (b) the air inlet. The amount of ether allowed to flow through the outlet is regulated by the screw B. This screw is so adjusted that a drop of any size may be obtained at desired intervals, and when screwed up it allows no ether to flow.

The air inlet is obtained from the flattened screw A, which pierces B and allows air to enter through the air inlet tube projecting to the bottom of the bottle. To use the bottle, the air inlet screw A should first be loosened, then the controlling screw B regulated. The bottle is made by Messrs. Mayer and Meltzer.

THE MOTOR SHOW.

FROM THE MEDICAL MAN'S POINT OF VIEW.

By H. MASSAC BUIST.

THE eleventh yearly International Motor Car Show promoted by the Society of Motor Manufacturers and Traders, and opened at Olympia, Kensington, on November 8th, under the patronage of the King, has a special message, or perhaps one might say series of messages, for the medical man, whose requirements may be considered to lie almost wholly along the line of products for those of moderate means. The first thing he must be sure of if he gets a car of any sort or size is reliability.

The sum of money at his disposal in the way of initial expenditure on the acquisition of a vehicle has often been such as to lead him in the wrong direction of goods that are merely cheap in nominal price without possessing those qualities of enduring service which alone can make them of value to the owner. Hitherto, let us bear in mind, the limited scale of output of the average manufacturer, combined with the tendency to divide it up between a wide range of models, has resulted in the impossibility of greatly reducing the price, while during the past twelvemonth, strikes and other troubles apart, the coming into force of the Insurance Act alone is adding to the cost of producing cars to an average extent of about £4 a chassis in the case of home-made goods. Further, in cars of high quality, no matter what the power, there is a fairly general tendency not to reduce but slightly to increase the cost. Analysis proves, however, that in such cases, more is always being offered for the increased cost either in the way of additional accessories, or of proportionately larger or more powerful engines, or in the standardizing of larger sizes of tyres, and so forth, so that in point of fact there is no case in which a 1913 car is dearer than the current types ; on the contrary, in the majority of cases, if we compare this year's with next season's types, it is to find that the newer patterns provide much better value for the money.

THE OUTSTANDING NOTE OF THE EXHIBITION.

Possibly the ordinary visitor to the Motor Show could go to and come away from it without gleanings the least hint of what was of most significance in it, alike to the prospective purchaser and to the motor industry in Europe. - He would see each maker's wares, including those of the Wolseley Company, which he would think very good value, and would merely wonder why the smallest 12-h.p. model was no longer marketed. The brief explanation is that this, our largest motor carriage manufacturing concern, owned by Vickers, and which hitherto has followed the general practice in providing a many-model programme, has abandoned that and is devoting the whole of its shops to the production of two models, being besides prepared to lay down, in batches of only fifty at a time, a very large six-cylinder type. When it is laid in mind that the Wolseley shops at Birmingham can be measured by the half mile, it will be appreciated that for all practical purposes this, our largest firm, is concentrating on two models only. Moreover, the lesser of them is not the 12-h.p. but a 16-20-h.p., worm-driven, four-cylinder machine embodying various improvements on the 1912 pattern, and possessing, besides, better coachwork than has hitherto been fitted, as well as the necessary provision for the equipment of a self-starting apparatus ; yet the price of the whole is only a few pounds more than the cost of the now abandoned (1912) 12-h.p. type. When the model offered for 1913 has been examined by men in the motor trade, not a few have spoken of it as being marketed at a cut price ; but this is quite incorrect, for there is as good a profit on it as on any vehicle the Wolseley Company has yet put on the market. There has been no elimination of features from the design, and as much material and workmanship as ever goes to the production of the vehicle, while more expensive automatic machinery than before has been included in the factory equipment for the purpose of producing it, so that the sole explanation of this offering of so much better value for money is that, instead of turning out the type by a hundred or two at a time, a minimum of four thousand identical vehicles is to be produced at the factory at the end of twelve months ; this means that the usually wasteful period of "turning over," as it is

called, is eliminated, and the works are to be kept going at full output for every week in the twelve months to the effecting of further economy.

A FRESH WAY TO GIVE BETTER VALUE.

But it were quite erroneous to conclude that this is a copying of American methods. On the contrary, it is everything that is not done there, as anybody might gather who considers the size of the Wolseley shops, for they occupy about as much ground as so-called American motor car factories whence issue machines at the rate of tens of thousands a year. The explanation is that the American principle, particularly in cheap car production, would be more correctly described as assembling from parts produced by specialists than as manufacturing cars, whereas the British method consists in producing practically every part of a car at the works whose name it bears. Hence there is no possible comparison, nor any attempt on the part of the British industry to reproduce American scales of output. It has been very hard to convince the British motor manufacturer that if he had the pluck to try it he would find he had a market for a thousand cars where he imagined he had an opening only for a hundred; and it remains true that we have not markets for ten, twenty, thirty, forty, and even a hundred or more thousand cars of a single type in any given twelvemonth, which is the situation that obtains in America. Why none should fail to take note of the Wolseley development, therefore, is that it gives the European public the true advantage that should come to it from the competition between the European and American motor industries, and a solution of the problem, from a manufacturer's point of view, of how to keep the industry going in this country in legitimate fashion and without embarking on anything so disastrous and useless as a policy of imitation. We may take this Wolseley example as illustrating the all-important point of a vehicle designed in a particular country to suit the requirements of the conditions under which it is to be used. Moreover, it will be found during next and the following seasons that the move which this concern has just made will practically settle the future policy of other motor manufacturers in Europe. Already by far the majority of them are inclining to give up the many model policy which divides an output of a thousand or fifteen hundred cars between anything from four to eight models. All the firms that have made most distinctive hits lately are content with either three or two-model programmes, as instance under the former head the Sunbeam concern, which has revealed itself to be the producer of the outstanding car of the last twelve months in competition, and under the second heading the Crossley firm of Manchester, which has also come to the front in another way since the holding of the last motor show. Time was, of course, when manufacturers were feeling their way, and when the motor business was a much more personal affair than it is to-day; hence they found themselves tempted to try and produce cars of every conceivable size and power, so that there might never be an excuse for them to miss an order. To-day the error of that policy is beginning to be realized all round, for surely it is impossible that any one firm can expect to give the best value for money in the matter of every size and make of car. This is the age of specialization in motor cars as in other affairs, and the realization of the fact is what will make the motor season of 1913 a historic one; incidentally it will prove of greater service to the medical man than any it has been possible for the industry to render him in the past.

A POSSIBLE OBJECTION ANSWERED.

The medical man is unwise unless he treats his motoring as a strictly business proposition, hence he may be expected to raise a very practical objection against what we may call the fruits of this new era in car production. Thus he may say: "Good, I can manage to pay the extra few pounds to get a larger size of car and a more perfect vehicle than the type that was previously within the range of my purse; but it will be of little use to me because I cannot afford the extra cost of running it." It is safe to assume that if there is any section of the motoring community which, as a whole, uses its cars in a reasonable manner, it is the medical fraternity. The vehicles are needed for strictly business service, which is quite a

different thing from scorching. Let us suppose that the medical man finds that a given 12-h.p. car will do all in the matter of speed that he needs, and that he is faced with the proposal to get a 16-h.p. for only a few pounds more. Being a quite up-to-date machine embodying the latest refinements, provided the owner is prepared to drive it in the same manner as the 12-h.p. machine in regard to accelerating the rate at which he climbs hills and the manner in which he applies the brakes, there need not be a five-pound note a year difference in the outgoing or running costs of using the larger and more powerful vehicle for doing precisely the same amount and kind of work, and, as such a machine will be able to do that work so very much more easily than a less powerful one, it follows that there would be a saving in the actual wear and tear bill in using the larger vehicle. And the owner has all the time the advantage of enjoying the use of a more luxurious machine, for a car never runs better than when it is working well below its maximum power. He has, besides, that extra body accommodation which is possible with the larger chassis. The cost, in other words, is the same if the conditions of use are reproduced exactly; but if the owner wants to use the larger powered car as near to the top of its performing as he would if using the lesser powered one, and wants to travel about the country at 30 per cent. greater speed and very possibly to put 25 to 40 per cent. on to mileage year in and year out, the costs will go up very appreciably. But that is a matter entirely optional with the owner.

THE AGE OF THE SELF-STARTING CAR.

These remarks have been necessary because we are arrived at the time when we must deal with quite a fresh phase of motoring, and one which furnishes not only the key to the meaning of the present exhibition, but which will enable the medical man to understand also the developments which will follow in its train next year and the year after. Compared with this, in fact, the other features of the show are of minor importance; yet, happily, some of them are of most direct interest to the profession. It may be recalled that last year I wrote in these pages of the coming of what may be styled the first positive self-starter in the combination Cadillac electrical device which started the engine, fired the mixture in the cylinders, and lighted the vehicle. Though stowed away in an insignificant corner of the building, that exhibit constituted the outstanding feature of the show, as may be judged from the fact that in the twelve months that have since elapsed this device has proved its worth in the hands of 12,000 users, as well as under a Royal Automobile Club test of an unprecedentedly severe character, in that it consisted first of choosing three cars at random from a consignment and of starting each of them up 1,000 times by the electrical energy stored aboard them, and without affording any opportunity, such as a run along the road, for those supplies to be replenished; yet there was not a single falter. Then to try the efficiency of the lighting and firing system the machine was taken over a period of a fortnight up and down the highways of the country with the full set of lights on all the time, including the whole of the luncheon intervals—a test to which no car electric lighting system has ever been submitted. It came out absolutely all right, the only thing that happened being that one or two bulbs blew out; they, of course, have nothing whatever to do with the plant. We see bulbs blow out on tube railways, as well as in our own homes, any day. Moreover, this device is now brought forward in a further improved form which reduces its weight, size, and number of parts. The single voltage system has been successfully adopted in place of the double variety, thereby eliminating the controlling switch, much wiring, and other parts. The voltage regulator governs the charging of the battery in automatic fashion, reducing to a minimum the attention needed on the part of the user.

INDEPENDENCE FOR THE MEDICAL MAN.

The net result of this development as concerns the industry in general was that at the motor show held in America in the early months of this year nearly every manufacturer found it necessary to fit some so-called starting device, the vast majority of them proving to be utter failures, a circumstance probably to be accounted for in

large measure by the fact that they had not been sufficiently tested. Be that as it may, as regards motors marketed in Europe, the influence of the self-starter—which is of not a little importance to the medical man, since with the advent of detachable wheels, car maintenance contracting businesses, and so forth, it is now possible for him to dispense with the services of a motorman to accompany him on his rounds—is apparent at the present show in a variety of directions. Thus the Lanchester concern comes forward with an apparatus consisting of a dynamo mounted on a bracket projecting from the brake casing and chain-driven off the transmission shaft. The dynamo spindle is fitted with a pinion meshing with teeth cut on the flywheel. The pinion is slid in the gear with these teeth by means of a starting lever placed conveniently to the driver's left hand, the ignition of the engine being automatically retarded whenever this lever is worked, so that should it have been left advanced by any oversight no harm can be done. After starting up the motor the dynamo charges the cells and, when needed, serves to light the car. Another device is brought forward on the six-cylinder White petrol car; all that is necessary is for the driver to pull a lever on the dash, whereupon a dynamo that is driven by chain from the magneto shaft starts the engine, the batteries furnished being powerful enough to supply current sufficient for turning the motor over for about half an hour. As soon as the engine begins running under its own power the speed of the electrical starting motor is increased, whereupon it becomes automatically a generator for recharging the batteries up to the necessary amount. These batteries also supply the current necessary for lighting the vehicle. It will be noted, however, that both these devices are of a supplementary character, and do not fire the mixture in the cylinders.

In another direction there is a simple spring device introduced by the Star firm, and so designed that should it fail to start the motor before its energy is expended a crank can be put in in the ordinary way, and, by the employment of reduction gear, the spring can be wound up with no more force than a child can easily exert, whereupon it is ready to do its work again. This device does not turn the crank-shaft many times, but while it is working it turns it very fast—at 300 revolutions a minute—so that it is guaranteed that any engine in proper working order that can be started up on the magneto by hand would be easily started by this apparatus.

VARIATIONS OF THE COMPRESSED-AIR SYSTEM.

The Newton and Bennett self-starter of the compressed-air sort has long been a feature of the S.C.A.T. machines, on which it is standardized, as is another air-compressor device on the Adams cars; but new apparatus of this sort is brought forward this year by the Wolseley Company, which combines the device with an automatic tyre inflator. The minimum pressure which will start the Wolseley motor when warm is about 50 lb. to the square inch, but when cold it is advisable that the minimum pressure available should be 100 lb. to the square inch; therefore a maximum pressure of at least 300 lb. is provided for in the device, the apparatus consisting of a compressor, a reservoir, a distributor, a valve and junction box, and dashboard control mechanism. The compressor is of the two-cylinder vertical type. When fully charged the reservoir is capable of starting up the car about thirty times.

Yet another variety is the Sunbeam engine starter, which takes the form of an air engine set at the rear end of the near side above the engine crank chamber, and which, by moving a pinion into engagement with teeth cut on the flywheel, couples up the air engine with the car engine. The air-compressor itself has its crank case formed in one with the lid of the gearbox. It should be pointed out that the compressed air is not admitted to the cylinder of the air engine, which works under entirely normal conditions when rotated by the air engine, precisely as though it were being cranked by hand, though the rate of turning is much faster. Thus there is no need for valves in the cylinder heads, or of distributing valves, such as is required on the ordinary atmospheric starter; while, when the car is running, none of the parts of the air starter are in motion, both air-compressor and air engine being then disengaged from their drive.

Another variety is the Delaunay-Belleville device, which takes the form of four horizontal air cylinders opposed in pairs, and set transversely athwart the frame of the car between the two dumb-irons immediately in front of the radiator, where the appearance is not greatly improved by a block of metal, though that is doubtless a minor matter.

What is of significance is the fact, illustrated at this show, that one after another of the leading motor manufacturers are realizing that the age of hand-cranking is rapidly passing, and that serious, varied and extensive practical efforts are being made to evolve the self-starting motor car. The welcome sign is that in another twelve months every maker will be coming forward with self-starting motor cars on some principle or other, the more so in that we see already that it is possible to do this in a variety of ways, each quite practical of its kind. That is surely good enough to go on with. We can wait a few seasons before determining which shall be the ultimate type or method.

OF MECHANICAL DEVELOPMENTS.

Turning now to general mechanical tendencies, changes in these are not numerous. Mors comes forward with a new type of so-called valveless motor; the Germaine firm from Belgium produces a 20-h.p. model equipped with a Daimler-built form of double sliding sleeve engine, and the 40 to 50-h.p. Peugeot car has a combination sleeve and poppet valve motor; while Argylls introduce a more popular powered single sleeve valve engine, dispensing with the junk ring hitherto deemed essential to sleeve valve engines, and Darracqs introduce two more popular rotary-valve controlled engines. It cannot, however, be said that the poppet valve engine ceases to enjoy what is practically a monopoly of patronage, while certain practices characteristic of it are being incorporated into other types. Thus, in the first place, from the very beginnings of competition work in the years when Mors and Brasier were successively supreme the cylinders were off-set in relation to the crank-shaft, a practice which we likewise find embodied in the standard design Sunbeam, which has never met a defeat in any of the many big competitions and world's records it has essayed this season. Hence it is not surprising to see that quite a number of cars—including, for example, the new Belsize, the Singer, some Peugeot models, and an Excelsior car—also have the cylinders off-set in relation to the crank-shaft, while perhaps more interesting still is the fact that in the new Daimler double sliding sleeve valve motors this system is introduced to the extent of 13 millimetres in combination with longer connecting rods and a longer travel for the sleeves, so that there is not only more perfect closing of the ports at slow engine speeds, but also a gain in smoothness of working, therefore of efficiency and absence of vibration through reduction of side-thrust and friction. One of the features of last year's practice, too, was the introduction by British makers of silent chains for working the distributing gear in the guise of cam and magneto shafts as well as water circulating pumps on poppet valve motors, a system first found possible by Daimlers with the sleeve valve engine type. This is now adopted by quite a number of poppet valve firms, including Cadillac from America, Adler from Germany, Excelsior and Métallurgique from Belgium, De Dion and Vinot from France, and Vauxhall and Swift in England, so that we see that the sleeve-valve engine is gaining from poppet-valve engine practice, and the pocket-valve engine is gaining from sleeve-valve engine practice, which is as it should be. The Darracq rotary valve, moreover, is now chain-driven.

POWER TRANSMISSION, SUSPENSION, AND COACH-WORK.

A few years ago there was a great vogue for the worm drive, which has gained extra adherents this season, too, in the new 30-h.p. Sheffield-Simplex model, as well as the 15 to 20-h.p. Armstrong-Whitworth, which exploits the overhead type, and sundry French makers now, including the small Brasier car, the 50-h.p. eight-cylinder De Dion, and, at option, the 25-h.p. four-cylinder and the 26-h.p. eight-cylinder types, as well as the Grégoire. But it would be quite erroneous to conclude from this that the bevel drive is going out. In fact, it never looked more like holding its own, for it has now been proved possible to

make on commercial scales bevel gear that does not undergo any distortion in the process of case-hardening. It is admittedly a more efficient form of drive, provided it can be manufactured perfectly accurately in order to make it as equally silent working as the worm variety, though in the case of very small bevel gear with what one might style only a few notches on the tail of the propeller shaft, there is, as M. Brasier points out, some advantage, instead, in having the worm drive.

There is not much change in power transmission, though, particularly in the case of smaller cars, quite a number of manufacturers are reverting to the principle of superposing the gear shafts instead of placing them in a common plane. This undoubtedly makes for enhanced silence of working. In regard to braking, the areas of the surfaces have been made of still larger proportion as an almost general practice, while the means of hand adjustment is being made more ready and accessible. Daimler puts the hand brake lever in a gate, to give the driver the opportunity of choosing whether he will declutch or not when the rear wheel brakes are applied. By reason of the mania for low-seated streamline bodies, the tapered bonnet and dash, with the petrol tank placed in a dust-raising position behind the back axle, is unfortunately becoming a somewhat general practice, for it is undoubtedly a retrograde step. Happily we may regard the development as purely in the nature of an ephemeral vogue.

Suspension has not undergone many changes. Quarter elliptic, lark-heel springs are evidently going to be used fairly widely for the little cycle type of car that is coming along—as instance, Peugeot and Humber practice—among others which will be further illustrated at the Cycle Car Show to be opened on November 26th in the same building as the current one, while, though the Wolseley Company is among those that have taken out patents for cantilever springs for big-powered cars, it does not show any at Olympia, nor does Rolls-Royce, though it has standardized its cantilever sort for 1913, and has this form of suspension on its trials car outside the building. There has been, however, a considerable spread of the practice of carrying the back springs below the axle, on the system that, for worm-driven cars from below the back axle, has three big advantages, and which has long been used by Renault with bevel drive. It was standardized by Wolseleys with worm-drive some time ago, while Daimlers and Peugeot are among the firms taking newly to it, and De Dion may be described as reviving it, in that it was a standard practice of their cars in 1899, when it was abandoned because the public did not appreciate the gains of it in those early days. As the system is likely to grow, it may therefore be pointed out now that by this means, with worm-drive below the back axle, there is less movement and consequently wear of the universal joints on the propeller shaft, less vibration and easier springing on rough roads, and less wear on the back tyres, the reason being that, with the spring attached below, springs and propeller shaft are parallel and spring about the same lateral centre in the case of worm-driven cars, hence the rear axle rises and falls in a natural arc.

Lastly, there are notable developments in coach-building by Lanchester, who builds up wooden bodies on a metal frame, so that coach-work, as well as car, have frames each fitting the other perfectly; and by the Birmingham Small Arms firm, that builds up its bodies in pressings of steel, mounted and cross-tied on a metal frame and standardized in four colour schemes. The gains of both systems embrace the possibility of replacing damaged doors, panels, or coach-work parts by return of post from stock, the end of the era of the coach-builder who makes his parts fit by chopping and paring with a chisel.

Features of individual car exhibits will be dealt with in subsequent articles.

The exhibition closes on Saturday, November 16th.

THE councillors of the city of Vienna who were recently on a visit to London voted on their return home a sum of 5,000 kronen to be sent to the Lord Mayor to devote to any charitable object in the City that he pleased. Sir Thomas Crosby, in virtue of this discretionary power, has sent the whole sum to St. Bartholomew's Hospital, which at present is urgently in need of funds. The sum in English money is equal to about £206.

DISCUSSION ON HEREDITY AND DISEASE AT THE PATHOLOGICAL SOCIETY OF MANCHESTER.

At a meeting of the Pathological Society of Manchester on October 9th, over which Mr. J. W. SMITH presided, a discussion took place on heredity and disease.

The subject was introduced by Dr. ARCHDALL REID, who, after some preliminary remarks on the nature of evidence and proof in biological questions, said:

Let us see whether we cannot reach a reasonably certain conclusion about the problem in heredity which most concerns us as medical men—namely, the problem as to whether parental disease tends to render degenerate the offspring subsequently born. By the word “degenerate” I mean innate degeneracy dependent on germinal change, of which the proof is that it tends to be transmitted to descendants.

Likenesses and differences between parent and offspring are of two kinds—inborn and acquired. The inborn likenesses and differences are due to germinal likenesses and differences. The acquired likenesses and differences arise because parent and child have developed under similar or dissimilar conditions. Inborn differences are usually called “variations”; acquired differences are termed “modifications.”

Darwin noted that offspring tend to vary from their parents, and that in every species a large proportion of offspring perish. Thereupon he made the reasonable inference that there was natural selection—that is, he supposed that, as a rule, the individuals who had varied so that they were well fitted for the struggle for existence had carried on the race, while those who were worse fitted were eliminated before they had contributed their quota of offspring. On this inference he founded another equally reasonable—namely, that it was this natural selection of the fit and elimination of the unfit that had caused species to differentiate from ancestral types and from one another.

Let us see whether we cannot substitute observation for inference, and so establish Darwin's hypothesis. The evidence I am about to bring forward should particularly appeal to medical men; it is by far the most decisive evidence known to me—indeed, it is the only decisive evidence in existence. Darwin, his followers, and opponents drew their evidence from plants and lower animals. It is impossible to observe whether natural selection does or does not occur among wild types. We are not sufficiently familiar with the details of their lives. Consider our most familiar animals and plants—for instance, sparrows, house-flies, and the grasses of our lawns and fields. How little we know about them; so little that we cannot observe whether any particular kinds of individuals tend to be weeded out or to survive. But now consider our own human species with every detail of whose existence we are familiar. Man has been termed by naturalists Nature's rebel son who has escaped from selection. You know from your own experience that this is not true. You have observed many human beings perish young, even in infancy, while others survive and see their grandchildren. Of what do those who have not contributed their quota to the species die? As you know, in the vast majority of cases, of disease. What kind of disease? Common experience and public health statistics all over the world tell us mainly of microbic disease.

Now, the question arises, are diseases selective? You know from your own experience that tuberculosis is selective. You know also that tuberculosis tends to run in families, and, therefore, that the diathesis is inborn and tends to be inherited. What you observe so clearly in the case of tuberculosis you may observe with more or less clearness in the case of every lethal disease. Here, then, is natural selection not inferred but actually observed. Man is no rebel son who has escaped from selection, but a dutiful and sorely disciplined child. And not by disease only is he disciplined. Here, in this great city of Manchester, for instance, he meets a complex of lethal conditions that weed him out most stringently. Only individuals who are very resistant to the conditions which prevail in crowded places can survive in great cities, and especially in their lower quarters.

As regards Darwin's second inference, that natural