

**Directions for insuring personal safety during storms of thunder and lightning, and for the right application of conductors to houses and other buildings. / By John Leigh, Jun., Esq.**

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**Publication/Creation**

London : J. Ridgway and Sons, Piccadilly, 1835.

**Persistent URL**

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# DIRECTIONS

FOR INSURING

PERSONAL SAFETY DURING STORMS

OF

**Thunder and Lightning,**

AND FOR

THE RIGHT APPLICATION

OF

CONDUCTORS

TO

HOUSES AND OTHER BUILDINGS.

BY

JOHN LEIGH, JUN., ESQ.

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1835.

DIRECTIONS

PERSONAL SAFETY DURING STORMS

STORMS AND LIGHTNING

THE GREAT BRITAIN

CONDYTTON'S

HOW TO USE THE TELEPHONE

JOHN LEIGH, 100, FLEET

CHARLES WOOD & SON, PRINTERS,  
Poppin's Court, Fleet Street.

## DIRECTIONS,

*&c. &c.*

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THE object of the following pages is the preservation of life and property ; and to facilitate their extensive and gratuitous circulation, philosophical speculations have been abandoned for the inculcation of practical knowledge.

From the prevalent fear of sudden death, and its frequent occurrence by lightning, few persons are exempt from disquieting apprehensions during the raging of that destructive element in their immediate neighbourhood ; nor is it surprising, that in those regions where storms occur more frequently, and with far more violence than in our own country, the untutored savage should recog-

nize in its fearful crash the voice of an avenging Deity, and seek a hiding-place from its impending fury.

This universal fear, though sometimes accompanied with, is not founded in superstition. The danger is certain, continually recurring, and frequently attended with fatal consequences. Superstition has, however, been resorted to, for the supply of preservatives totally fallacious, and repugnant to common sense. A document ordinarily known by the name of "*Christ's Letter*," is carried about the person, as a charm against the fatal effect of lightning, and sundry other calamities. Sprigs of thorn bushes, carried about the person, or placed in the different rooms of a house, are also supposed to ensure safety, from an absurd and false idea that thorns are not damaged by lightning\*. These, and other su-

\* Another strangely absurd superstition, though not in immediate reference to this subject, has come under

perstitious observances equally foolish, are more extensively adopted, even at this day, than those who are unacquainted with the habits of mariners and of our own peasantry will readily believe.

It is the design of the following pages to remove these delusions, and to explain those substantial measures for self-protection, and those really useful precautions, of which every one who chooses may avail himself.

One word to those disciples of the school of fatalism, who, with more fanaticism than scriptural

the notice of the writer while these observations are in the course of correction for the press; namely, that in cases of death by drowning, if quills filled with quicksilver be stuck in little loaves of bread, and thrown into the water, they will by some magic influence float about till they come directly over the spot where the dead body lies, and there remain stationary: little less ridiculous than the Irish legend, that the dead body, touched by the hand of its murderer, will indicate symptoms of reanimation.

philosophy, exclaim ; “ Confiding in the protection of providence, and unable to avert God’s dispensations, I am under all circumstances equally secure.” It is enough to answer, that a wanton exposure of life, is not only unwarranted, but expressly forbidden. Due regard to the ordinary means of self-preservation is a duty ; and when science, in the progress of civilized life, offers increased securities, their rejection is criminal. In spite of all human prudence can suggest, or ingenuity devise, life still remains sufficiently precarious ; and no man under wanton exposure to danger, is justified in the expectation of a special exertion of God’s providence in his behalf.

The identity of lightning with the fluid produced by means of an electrical machine has been long established, and forms the ground-work of our knowledge of the former element. The similarity is perfect in every respect except that of quantity : but though, by our artificial method of collecting electricity, we can only make expe-

riments on a small scale, our knowledge of its laws and properties is not the less complete ; for, like fire and water, it acts upon, and is liable to be acted upon, by the same agents, with similar results, be the quantity small or great.

Our whole knowledge of natural philosophy consists in, and is derived from observation. In determining, therefore, what we call the laws and properties of electricity, we simply observe how it acts upon external objects, or how it is itself affected by external objects, when artificially produced. It is from knowledge obtained in this manner, that the following regulations are drawn up. Here, therefore, there is no uncertainty or conjecture : all is positive, assured truth ; and whoever violates these rules, does so at the hazard of his life.

The word *lightning*, in its true sense, means only the flash of light emitted during the passage downwards of the electric fluid ; but it will be

used here in its popular meaning of the electric fluid itself.

All metals and most fluids attract and conduct lightning, and so also do trees and buildings. The most frequent cases of death or injury occur from persons inadvertently placing themselves under or near whatever attracts and conducts lightning. Thus, there is nothing more common than, during a thunder storm, to shelter under trees ; which, from their height and qualities as conductors, are very dangerous objects for any person to be under or near. If the lightning is nearly overhead, it is much more probable that it will strike a tree, or other elevated object round about, than discharge itself on the level surface of the ground. If it strikes the particular tree under which any person has taken shelter, that person will almost inevitably be killed ; for the tree being an imperfect conductor, and therefore incapable of carrying away the

lightning harmlessly into the ground, the lightning will be diverted by almost any person or thing at the foot of the tree, and destroy or injure them.

Some conductors are called *perfect*, from their greater capacity for conducting; and others *imperfect*, from their being bad conductors. Trees are of the latter class, and therefore it is, as has been hinted above, that the lightning having shattered the tree in its descent, is ready to be carried off by any fresh object that presents itself. Hence also it is, that the lightning, instead of immediately entering the ground at the root of the tree, frequently runs along the ground a considerable distance before it is dissipated; and this is the reason why it is not only dangerous to be *under* trees during storms of thunder and lightning, but it is also dangerous to be *very near* them.

In the summer of 1831, a party of haymakers, among other instances, were struck by lightning

above twenty yards distant from a tree on which the lightning first descended: two were severely injured. In another instance a tree was struck by lightning, about fifteen yards from which were some iron hurdles. The lightning flew off from the tree, and left traces of having passed along the hurdles more than thirty yards. In the summer of 1815, at the moment of one out of a tall clump of ash trees being struck by lightning, a man who was passing about thirty yards from them was very sensibly affected, and his eye-sight weakened for many years after. It is true that there are instances of persons escaping unhurt, though almost in contact with the object struck; but such providential deliverances form no argument against the truth of the general rule, or the expediency of avoiding such dangerous positions. Notes of several accidents of this kind are at hand at the moment of these lines being written, but which it would occupy too much space to insert. In some cases the effects

of lightning have been felt at a distance of forty yards or more from the object struck, and when it could only be conducted by the ground. It may be noticed, that when the ground is very wet, it forms a tolerably good conductor from that circumstance, between the object struck, and the person near it; and if lightning falls before rain has commenced, and while the ground is in a very dry state, it has on that account less facility for entering the earth, and is therefore the more likely to pass along the surface, laying hold of the first conducting substance that presents itself.

It might be supposed, that the danger of taking shelter under trees being generally known, none but ignorant persons would risk their lives by placing themselves in such situations, but unhappily this is not the case. Having noted down the various accidents and losses by lightning for a few years past, occurring within our own knowledge, or well authenticated, we find ten instances

of persons in the higher walks of life having lost their lives from taking shelter under trees, either on foot or on horseback, during thunder-storms. There is no particular object in publishing at length these fatal events, of which so many accounts may be found year by year in every newspaper. One or two will be sufficient here. In the early part of the summer of 1832, during a violent storm of thunder and lightning, D. P. Esquire, at L. went under a large elm tree, and placed himself close against the body of the tree. The tree was struck with lightning almost immediately after, and his instantaneous death was the consequence. The deceased was a magistrate of the county in which this occurred. Two young gentlemen, both of good expectations, were struck dead under similar circumstances somewhere about the year 1811.

In the summer of 1833, a party of five persons sheltered during a storm under a small oak tree : two were presently killed on the spot, and another

injured. A gentleman on horseback, perfectly aware, as it appeared, of the imminent danger of sheltering under trees, rode under a lofty ash tree, while the rain was severely pelting during a storm, and was killed the instant after: the horse also was struck dead. There are many, very many instances in which life has been thus hazarded, in preference to enduring temporary inconvenience. But we can occupy no more space with examples.

There can be no doubt that the electric fluid discharges itself in greater or smaller quantities, according to the state of the atmosphere, and hence arises the difference in the degree of damage occasioned by it. Sometimes it enters the earth with scarcely a visible trace, at other times laying it open for a considerable space. Sometimes it kills only a single bough on a tree, leaving the appearance of a mere blight; at other times, as happened not long since in Windsor Great Park, the tree is set on fire, and burns till the trunk is

completely destroyed. A correspondent in the "*Scotsman*," in 1833, relates a case of extraordinary violence in the descent of the electric fluid, in which a portion of earth was violently tossed up to the height of fifteen or twenty feet. Quantities of worms were found lying dead, in a half broiled state. The ground was excavated in the centre of the place to the depth of thirteen or fourteen inches. From the same reason a temporary injury only has been sustained by persons so situated, that they must inevitably have been killed, had the lightning descended with a little more severity.

It has been observed, that it is not only dangerous during a storm to be under or near *trees*, but also all other substances that attract and conduct lightning. A most lamentable occurrence in illustration of this took place a few summers ago on the Malvern Hills. Near the summit of the *Worcestershire Beacon* is a round turret, or summer house, with walls of stone, and a roof of

sheet iron. Within this place a party took shelter on the approach of a thunder storm. The lightning struck the roof, and the instant death of one of the party was the result\*.

Had there been any sufficient conductor to convey the lightning from the roof into the ground, this accident would not have happened; but as there was not, the walls were shattered, and the fluid dispersed in all directions. Even in this case the lightning probably followed the walls, notwithstanding their imperfection as conductors: *for it is a general rule, that lightning, that is the electric fluid, will not under ordinary circumstances pass through the air unaided by a conductor, unless compelled from the absence of all conducting matter; and if no perfect conductor presents itself, it will avail itself of an*

\* This place, known to Malvern visitors by the name of Lady Harcourt's tower, still remains roofed with iron, as when the melancholy event just alluded to occurred. Such negligence is very culpable.

imperfect one, such as was in this instance afforded by the walls, rather than pass through open space unsustained. There can be little doubt therefore that the unfortunate sufferer was in this case *contiguous* to the wall, and that the escape of the rest of the party was owing to their more central position, that is, to their not being in immediate contact with the wall of the building. Nearly similar to this occurred an instance of death by lightning in the course of last summer, at Rahon, near Doyle, in a low shed, where a number of labourers had collected for shelter. So again, in the Moorlands of Staffordshire, in a small cottage, into which the lightning descended by the chimney, the only person killed out of seven or eight who were crowding together for shelter, was a child lying on the floor, and resting against the wall. So also it happened, where lightning entered a room in which a party was at dinner : the only person at all injured was one of the servants, at that

moment, as it happened, standing very near the wall. And a little volume of similar examples might be readily collected.

It may be stated as a general rule, that a person whose clothes are wet, incurs less danger during a storm than in the case of their being perfectly dry ; and the lives of parties struck by lightning have been frequently preserved, owing to this circumstance : for water being a good conductor of the electric fluid, the lightning finds a passage to the ground, sometimes without injuring at all, sometimes after injuring only in a slight degree the parties on whom it descends ; and sometimes the clothes and shoes have been partly consumed without any lasting injury to the wearer.

In reference, further, to the danger of particular situations out of doors, it may be observed, that the more exposed the situation, and the higher the ground, the greater is the danger. It is true, that lightning sometimes falls on low

ground, in valleys, and in sheltered situations; but those objects are nevertheless most frequently struck, which are highest and most exposed. A strong current of air, or a run of water, will sometimes conduct lightning: and confined streets, arched passages of inn-yards, and similar situations, are not safe places of shelter for this reason. The run of water down the sides of streets, so common in Cornish towns, and to be found in all towns during a violent thunder shower, will often conduct lightning some distance from the spot where it first falls. A few summers ago, a gentleman was struck by lightning as he was crossing one of these water-courses, the lightning having descended by an iron lamp-post, and followed the course of the water.

Travellers by carriages and stage coaches are safer inside than out, during a storm of thunder and lightning. In the instance of a providential escape near Tenbury in Worcestershire, when a

gentleman and lady had exchanged places with their servants, to obtain a more commanding view of the scenery through which they were passing, and mounted on the barouche of their chariot for that purpose, the horses, the postillion, and the lady and gentleman, were considerably injured on the sudden discharge of lightning, while the servants inside remained unhurt. Travellers in the inside of carriages on rail-roads incur little danger, because the metal outside the carriages is in immediate communication with the rails, by which the fluid is provided with a safe and instantaneous vent.

It is not safe to be very near the *outside* of a house or other building, or to shelter under the eaves during a thunder-storm. Persons sheltering under hay or corn stacks have been sometimes much injured by lightning. In short, it may be laid down as a general rule, never, during a thunder-storm, to be contiguous to any lofty object whatever; and in case of sheltering,

a bush is safer than a tree, and *the inside* of any building much safer than the outside.

Deaths or fearful injuries have sometimes occurred from lightning, where there have been no previous circumstances to warrant an apprehension of danger; that is, at the commencement of a storm, before thunder has been heard or lightning seen. It happened so in the instance just referred to near Tenbury: and so, under somewhat similar circumstances, so far as respects the absence of all appearance of danger, Professor Richman, of St. Petersburg, lost his life. While collecting electricity from the atmosphere, and not suspecting its immediate presence in so great a quantity, he approached the ball attached to the rod by which it was collected, and a ball of fire darting from it to his head, he died instantaneously. From the appearance of the clouds, and the oppressive state of the atmosphere, we may usually augur an approaching storm. To what degree of intensity

it is necessary the electric fluid should, in the various states of the atmosphere, be accumulated, before a discharge takes place,—of the immediate causes of these discharges,—or how they may be accelerated or retarded, — on these points we possess only a few general ideas, unsatisfactory and insufficient for well-warranted conclusions. In most cases it happens, that we hear the rumbling of the distant thunder, and watch the lightning as it gradually comes nearer; and it is under such circumstances that the precautions to which attention has been here directed, may be, and ought to be, adopted.

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Hitherto, it will be observed, allusion has been made to such accidents only as happen out of doors: and as the general practice of taking shelter under trees, or against the outside walls of buildings, stacks, &c., has been condemned, it will be naturally asked, What, then, must be

done for shelter? The answer is, seek shelter in the *inside* of a house or barn, stable or shed, as soon as possible. There you are comparatively safe, if attention is paid to the directions which follow: but it may be remarked, that, if it should at any time be absolutely necessary to shelter in the open air, the lower that shelter is the better. Thus, as before observed, it is less dangerous to shelter under a bush than under a tree; and it is better to shelter under bushes in a hedgerow, than under a bush standing by itself.

It will be necessary, now, to state what are the safest situations in the inside of houses or other buildings; and what particular situations are dangerous, and desirable to be avoided. In outbuildings, the lofts, from their being so near the roof, are not so safe as the ground floor: but this does not apply to the upper chambers of houses, which have lofts or garrets again above them. Whether in a house or building of any

other kind, during a thunder-storm, do not place yourself touching or very near the walls; but keep as much as possible in the middle of the room or building, taking care not to place yourself under any metallic substance, such as a chandelier, &c.; or, if in a low building, immediately beneath a beam.

Some persons, who are alarmed during thunder-storms, will open all the doors in a house, and shut the windows; others open the windows, and shut the doors; and some are silly enough to keep open both doors and windows. Now all these little contrivances are of no use. You cannot bow the lightning in at one end of a room, and out at another. You cannot shut up lightning in a box; and if it comes down the chimney, as it usually does, you cannot, either by leaving the door or window open, direct it to pass through: it will always follow the best conductors. Concern yourself only about your own situation in the room. Sit as far removed

from the wall as circumstances permit, and not very near the fire-place; for, besides there being so much metal about the fire-place, which would attract the lightning towards it, by whatever means it might enter the room, it is usually found, that, when a house is struck, the lightning has descended by one of the chimneys, probably owing to their prominent situation, rising some feet above the rest of the building. After arriving at a fire-place in an upper room, it will frequently pass through the floor, attracted by the metal around the fire-place in the room beneath.

When it has once entered a room, it will leave traces of having passed over almost every thing of a metallic nature near at hand. It runs round the gilded frames of pictures, strikes along the metallic rods from which pictures are hung, the strips of gilt wood running along the tops of wainscoting, and bell wires, which are usually melted. If no metallic conductor is at hand, it

will pass round the walls of a room, conducted by the paste between the paper and the walls, if at all damp, or even without such assistance. Unbattened walls, and the walls of most cottages and outbuildings, contain more or less moisture, which facilitates the passage of the electric fluid around them; and it is therefore very dangerous to be in contact with them. Under any circumstances, walls form imperfect conductors, whether they are supposed to be damp or dry, and whether they are outside or inside. A position in a room immediately adjoining the walls, is always therefore to be particularly avoided.

When a house is struck by lightning, it is impossible to calculate the extent of damage that may be occasioned. The bell-wires are one great cause of its dispersion, along which and other similar conductors it sometimes passes many yards, and then strikes through walls and other impediments, attracted by metal of superior bulk on the opposite side. It realizes the ancient

fiction of the divining rod, and discovers metal wherever and however concealed, which ought not, for this reason, to be unnecessarily employed in building\*. Notwithstanding, however, the destructive and searching properties of lightning, far surpassing every thing besides, a person may consider himself — so far as human calculation can extend — perfectly secure in the middle of a room, or any open space under cover; and the larger that room is, the better. This security arises, as has been explained already, from the circumstance of lightning never flying across open space and unconducted, so long as it can possibly catch hold of a conductor.

Since a current of air will in some measure

\* The joists of floors are sometimes connected by iron rods, intended to keep them in their places. It is an unnecessary expense; and in case of lightning, unless the house were provided with conductors, would be dangerous.

conduct lightning, a position between a door and window, if open, or window and chimney, should be avoided. The door-way of a house, or a passage, is not so safe as the middle of a room, through which there is no similar current of air.

A bed is one of the safest places a person can be in; and it would be rendered more secure still, if removed a little from the walls; and if provided with wooden curtain-rods instead of metal, and if there was no bell wire immediately over-head. Under ordinary circumstances, it may, however, be considered a tolerably safe situation.

It was originally intended to have furnished instances of death by lightning, in consequence of the precautions hereinbefore explained having been neglected; and many such instances have been collected by the writer, for some years past, with that view: but the design has been abandoned, to avoid increasing unnecessarily the bulk of these hints and recommendations.

THE concluding remarks will be devoted to Conductors, their utility, and right application. Conductors consist of metal rods, about three-quarters of an inch in diameter, rising about six feet above the highest part of the building to which they are attached. The object of their erection is to attract the lightning, and convey it harmlessly into the earth, when it would otherwise enter the building, and create damage. They are agreed, on all hands, to be the surest preservatives against the ravages of lightning that can be devised or required; but are nevertheless by no means generally adopted in this country, owing to the ignorance which mistrusts their efficacy, and undervalues their importance, or the folly that presumes upon security in having so long escaped unhurt.

The expense of their erection is small; while few houses of any size have been struck by light-

ning, without sustaining damage to the amount of perhaps two hundred pounds, leaving personal security out of the question. In applying conductors to houses, the following particulars are important.

If the house is a large one, one conductor will not be sufficient: it will then be desirable to erect two or more, according to circumstances, one at each angle of the building, a precaution generally adopted with powder magazines, for ensuring additional safety: but it may be observed, that one conductor is, in all cases, better than none at all. The higher the conductor rises above the most elevated part of the building the better; but it is not usual, and perhaps not necessary, to carry conductors more than six feet higher than the tops of the chimneys, and this is better than less. They are pointed at the tops, sometimes made in the form of a crescent, and may be advantageously gilt for six or eight inches, to prevent rust: it is well, also, to paint

them all the way down. They are sometimes made less; but they are better not less than three-quarters of an inch in diameter. All metal on or about the roof should have a metallic connection with the conductor or conductors, or one of them. If there are metal tops to the chimneys, it should especially be taken care that there is a very good metallic connection between them and the conductors. The plan is sometimes adopted of building continuous strips of lead into every wall, which are connected with one another by horizontal strips, and connected also of course with the conductor. It is always desirable to conduct the lightning down in as direct a course as possible; and sharp angles in the conductor should therefore be avoided. The particular point where they are most advantageously applied, must be entirely determined by the nature of the building; the object being, to place the conductor or conductors at that particular point, or those points, supposed to be most exposed.

The mode of fastening the conductors to the walls, has been the subject, from time to time, of much discussion. Here, again, much depends on the nature of the building. If the lightning is well carried off from the bottom of the conductor, as will be explained presently, there is no danger, if the conductor is fastened to the wall by short iron staples. In some cases, intermediate fastenings might be dispensed with entirely; the conductor, from its entering some depth into the ground, being firmly fixed at the bottom, and secured at the top by passing through, or being well fastened to, the eaves. It would also be a precautionary measure worth adopting, where it can be conveniently done, to take out a brick, and build a piece of wood in its place, with a projection through which the conductor might pass. But short metal fastenings will be perfectly safe, if attention is paid to the following important precautions, which ought not indeed, under any circumstances, to be neg-

lected. The conductor should either be continued a considerable depth into the ground, till there is a probability of its being pretty well surrounded by moist earth, or should be placed in immediate connection with some fresh conductor. If a well, or a pool of water, is at hand, the purpose would be answered, by connecting the bottom of the conductor with the water by means of a metal rod or chain. But if the distance of water from the bottom of the conductor is so great as to render a connection with it too expensive, the object will be equally well answered by carrying the conductor down to a depth of six, or eight, or ten feet below the surface, according to the nature of the ground, till it may be presumed to be surrounded with considerable moisture.

In this manner the lightning is carried away safely, and dissipated in the earth; whereas, if no provision is made for its passing away from the conductor, and if the conductor either stopped

short of the ground, or was imbedded in perfectly dry earth at the surface of the ground, the lightning, having struck the conductor, would be liable to fly off again, and be diverted by any neighbouring conducting substance. In short, you would, in that case, have a conductor imperfectly insulated, which would be capable in some degree of attracting, but incapable of conveying away the lightning with any degree of certainty and security.

Some houses, from the peculiarities of their situation, and the proximity of lofty trees, are tolerably well protected without the assistance of conductors; and where these natural sources of protection exist, they should not be rejected. Trees so situated should not be removed; and, under some circumstances, they might be advantageously supplied with conductors. On the Continent, where houses are much more frequently constructed of wood than in England, they are very commonly set on fire by the elec-

tric fluid; which, if in towns and villages, of course endangers the adjoining properties.

An account has just reached us, of lightning falling in the hamlet of Vie-sur-Aisne, department of Aisne, where ten houses, and upwards of twenty barns and cottages, with all the furniture and produce they contained, were entirely consumed. The damage, however, in this country, to houses from lightning, is annually very great, and well justifies an urgent appeal on behalf of the more frequent adoption of conductors. At present, they are more common abroad than in England.

All church steeples and spires ought to be supplied with conductors. It is true that many churches, and some of these in exposed situations, have long remained unprovided with them without injury, but the hazard and danger is not less certain, and such accidents occur in sufficient number to render a wilful neglect of a precaution so readily adopted, highly culpable. A church

near Northwich\*, in Cheshire, was not long since struck by lightning. The steeple of the parish church of Kemble, Wilts, was struck by lightning lately, by which the top was carried into an adjoining field. The same church was similarly injured about ten years before. If a spire or steeple is struck by lightning, the damage to the building is usually considerable; almost always twenty times as much perhaps as the expense of erecting a conductor would have been. If the spire is of wood it frequently takes fire, as was the case with the spire of High Roothing church, which was struck by lightning in 1832. At a time where so many new churches are in progress of building, it is the more important that these remarks should be pressed into notice. The magnificent spire of Strasbourg Cathedral has been twice struck by lightning: the last time in 1833.

The number of cattle annually destroyed by

\* Davenham Church.

lightning is very considerable, chiefly in consequence of their collecting for shelter under trees during thunder storms. At Melksam, in Staffordshire, a cow was killed under one tree, and a lamb under another, last year ; and a large oak (under which, during the same storm, some labourers had been considering about taking shelter, but who on second thoughts ran home) was rent to pieces, the largest limb being thrown 48 yards. In the same county, a short time after, five sheep were killed under a tree. And in the same month, a flock of sheep, at the Isle, near Shrewsbury, having sheltered under a tree, were suddenly scattered by the lightning, twenty of them destroyed, and the remainder, stupified, blinded, and scorched, were thrown all around. To avoid such accidents, it might be desirable in some cases to build sheds for cattle to shelter in, and attach conductors to them on the outside to secure them from harm, if the shed should be struck. And since cattle, especially horses, are often averse to entering build-

ings for shelter, and always prefer sheltering under trees, it might frequently be expedient to rail or wall round trees on high land, and in exposed places, to prevent their standing immediately beneath; and in this case also there should be a conductor to the tree, descending a few feet into the ground. These remarks are especially applicable to large enclosures and leys for cattle, in which great loss frequently occurs from lightning. There is sometimes a favourite tree here and there on high knobs of ground, under which cattle are accustomed to shelter: these, if the above suggestion is not adopted for rendering them secure, should be cut down.

The application of conductors to vessels at sea is too much neglected; their benefit is unquestionable, especially in those latitudes where thunder-storms are most prevalent. The brig *Lucy*, of New York, was last year struck by lightning: the main and foretopmasts were shivered to atoms, and the deck planks were

ripped up from the timbers and beams. The event was so instantaneous, that in five minutes the ship and her crew perished, one man only excepted, the vessel going down immediately. This, and thousands of similar accidents, attended not always with such fatal consequences, but always with more or less damage, might have been avoided by the adoption of conductors.

As to the method of attaching lightning conductors to ships, the subject has been so ably handled by Mr. Snow Harris, of Plymouth, both in illustration of their utility, and in facilitation of their commodious and right application, that more remarks in respect of them, in a little treatise of this general character, are unnecessary. The object he proposed to himself in their application and construction, is the principle to be always kept in view in the construction and application of all conductors, whether at sea or on land; namely, that they should be as continuous and direct as possible, from the highest point of the

object to be preserved to the ground. It is to be regretted that the Admiralty have not yet generally introduced them in the navy.

Once more, in conclusion, let the reader of these observations consider this:—that in the ordinary concerns of life, no one doubts for a moment, not only of the expediency, but of the imperative duty of availing himself of the benefits resulting from science and art in the preservation of life and property. The safety lamp for preventing explosions in mines is one instance; the various contrivances for preventing the affection of the lungs of the Sheffield grinders; and the life boats, life buoys, Captain Manby's projectile apparatus, the invention of the wire gauze fire-proof dresses, and the whole history of the "Royal Humane Society" from the first hour of its institution, supply similar examples. Who commits himself in an insecure vessel upon a tempestuous sea without chart, or compass, or nautical knowledge? Who rejects medical aid in

sickness, or reckons himself justified in not procuring the best assistance under such circumstances for himself or family, which he is capable of obtaining? The overseer who, neglecting to provide such assistance, suffers the death of the meanest pauper to ensue for want of it, is indictable. Who but a madman would refuse to suffer a fire engine to play upon a burning dwelling, on the ground that, if it was God's will, the house would be consumed in spite of all human efforts to save it? When the cholera was making such fearful havoc in our densely populated towns, we proclaimed a fast, and rightly: but who thought of the mad proposition, that professional assistance should be prohibited? The conclusion is obvious. It is the duty of those who know the measures necessary for protection from the ravages of lightning, as specified in these pages, to adopt them; and it is the duty of those who know them not, to learn them.

The same arguments were in substance urged

in a former page : at the risk of offending by repetition, we feel justified by the importance of the subject, in recurring to the same line of argument. It is said in Alexander's travels in Russia,—“In the hospital of the nunnery there were several sick ; and, on our inquiring for the doctor, and asking what remedies were usually employed, they pointed to the image in a corner of the apartment, and said, ‘ That is our doctor ; if it is God's will, the sick will recover.’ On being asked, ‘ If a person breaks a leg, what's to be done?’ the reply was, ‘ If it is God's pleasure, it will become straight again!’ We laugh at the absurdity of such semi-barbarians : — whoever neglects the means of safety here enforced, makes very little better use of his reason.



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