same time, to fill it. P is then placed into the vessel, as represented, and the fluid, passing through the small holes, stands at the same height in it as in the vessel. The large leg is quickly dropped into P and the fluid displaced by it will rise and charge the syphon. If the large leg be placed gradually into P, no effect would follow, because the fluid would have time to descend to its level through the small holes.

Another mode of using the syphon for transferring acids, occurred to me, and which I have found to answer. You are aware that the silversmiths make small syphons for withdrawing wine from bottles, &c., which are frequently accompanied with small exhausting syringes, for the purpose of charging them. The one proposed has a substitute for this syringe.

Fig. 1 represents a common syphon, with a small tube attached to its longest leg, similar to the common sucking tube. It is made to pass through the centre of a larger tube, A, which is closed at the bottom. This tube is filled with water (or other fluid) to the top of the small tube. 2 is a tube closed at its upper end. Its internal capacity should be about twice as great as that

of the syphon. It is made to slide in the tube A, as shown at 3. To use it, fill A with water, then place the short leg into the liquid to be withdrawn; after which, close the orifice of the other leg with the finger, and raise the tube 2, till the syphon is filled; then let 2 descend as at 3.

Examination of Dr. Herschel's Theory of the Constitution of the Sun. By V. VALUE.

The sun, the acknowledged centre of our planetary system, offers such an important subject of contemplation, that it has always excited the admiration, wonder, and gratitude of mankind. As it is, for us, the focus of light and heat, it was natural enough to consider it as a globe of fire, as a mass of ignited matter, from which we derived the most important benefits; and therefore we find it, as the soul of the universe, worshipped from the remotest antiquity. In the eyes of its adorers, it was the deity itself, and, without presuming to investigate the nature of its constitution, they supposed it to be self-existent, and, of course, eternal, incombustible, indestructible. When the knowledge of the true God taught mankind to look upon the sun as the work of his hands, that luminary became mere matter, and, of course, a proper subject of investigation. One of the first and most obvious inquiries was, *By what means could such an immense fire be fed?* However easy and natural the question might be, its solution did not the less remain a mystery for us. We felt the genial warmth of the sun, and could not, without rejecting the conviction of our senses, consider it otherwise than as a globe of fire. Hence, conjectures, hypo-

theses, theories, succeeded each other, to establish its fiery nature; ingenious and learned calculations were made, to show that the immensity of that globular furnace could, without any sensible diminution, supply the inconsiderable quantity of light and heat it diffused around. So that, with the universal consent of Italian, German, Prussian, English, French, and American astronomers, the sun was considered as a globe of fire, until, in 1794, the learned and indefatigable Dr. Herschel, with one powerful effort of his gigantic genius, deprived it of its inflammability, and converted it into an opaque body. In the 16th century, (1530,) the crystal heavens of Aristotle had melted away under the calorific power of the sun, as the centre of our planetary system; in the 18th, that luminary was divested of its very caloric. So fluctuates human wisdom!

My intention is to present a few observations on the theory advanced by Dr. Herschel. As, in every new elementary book, it appears to be presented without comment, and, of course, as the most probable conjecture, it is well, perhaps, to examine its bearing.

In the London Philosophical Transactions, for 1795, Dr. Herschel has given an explanation of his views.

He says,—“The sun, like the planets, is an opaque, or dark body, surrounded by a vast atmosphere, containing clouds created by the constant and extensive decompositions of its elastic fluids; and that those clouds are of a phosphoric nature, and attended with lucid appearances, by giving out light.” But he supposes that the rays emitted by that luminous substance contain no heat, because, if they did convey all the heat we feel, they ought to act with more effect when their course is less interrupted, viz: on the tops of high mountains; we know, however, from observations, that these are constantly covered with snow. Moreover, the intense cold experienced by aeronauts who have ascended to any considerable height, corroborates the hypothesis that the rays of the sun are divested of caloric.

Hence, the Doctor thinks that we receive light, not from the opaque nucleus of the sun, but from its luminous atmosphere, and that the rays which convey that light contain no heat, when they emanate from it. But when and how do they receive the heat they undoubtedly communicate to us? The Doctor very ingeniously explains it thus:

“Heat is produced by the sun’s rays only when they act upon a calorific medium; they are the cause of the production of heat, by uniting with the matter of fire which is contained in the substances that are heated, as the collision of flint and steel will inflame a magazine of powder, by putting all the latent fire it contains into action.”

The unavoidable conclusion to be drawn from what precedes, is, that the solar rays contain light, but no heat; that they traverse the immense distance, the 95,000,000 of miles that separate us from the sun, and reach the tops of our highest mountains, without experiencing any alteration; and that they could, unchanged, go to any given distance, even to Sirius, or the remotest of the fixed stars, for no alteration can take place in them, except they find a *calorific medium* with which

to unite. That calorific medium is, with the earth, and, we may presume, with every other planet, the denser strata of the atmosphere.

From the Doctor's premises, viz: that the sun's rays carry no heat, but that they receive it from our atmosphere, we infer, that—

1. The solar rays, on account of their obliquity, in the morning and evening, ought to disengage more heat than at noon.

2. That, for the same obliquity, the heat ought to be more intense in winter than in summer.

3. That the light from the fixed stars ought to produce as much heat as the sun's, if not more.

4. That the planets ought likewise to impart to us a degree of heat proportional to their atmosphere.

All these conclusions contrast so strongly with the unerring results of our experience, that they will be rejected at once. Yet, if fairly deducible from the Doctor's theory, they ought to be adopted, or else the theory should be discarded.

I will now proceed to show that these inferences are the natural consequences of the above hypothesis of Dr. Herschel.

1. The solar rays, according to the learned astronomer, are cold when they emanate from the sun; they shine upon the summits of our highest peaks, without acquiring sufficient heat to melt snow; and yet those rays, near the surface, will raise the thermometer to 120° Fahrenheit. That difference of heat must then be received in the passage through the denser portions of our atmosphere, and it must be, as the Doctor says, on account of "*uniting with the matter of fire therein contained.*" This is the important point.

Since those rays become calorific only when in contact with the denser strata of our atmosphere, it follows, that the longer that contact continues, the hotter the rays must become. Hence, when the sun's rays fall obliquely, as they then receive the heat of a greater quantity of the *matter of fire*, or unite with a greater portion of it, they ought to be hotter. But is that the result? Experience is here in direct opposition to the theory. Every morning and evening, the rays fall in an oblique direction, and yet we know that the temperature is not then of the highest degree.*

2. The same reasoning applies with equal force to the position of the winter rays, their obliquity being greater in that season than in summer.

As our atmosphere is the chemical laboratory of heat, which is disengaged from it by *cold light*, is it not reasonable to suppose that, from whatever source we obtain that cold light, the result must be heat? If so,

3. The rays of light from the fixed stars ought, when in contact with our dense atmosphere, to produce a heat equal to the sun's rays.

This idea will seem so preposterous, it is so contrary to daily ex-

* On account of the same obliquity, the temperate zones should be more heated than the torrid, and the frigid zones still more than the temperate, whenever the solar rays reach them.

perience, that it will be instantly ridiculed. Yet it appears the unavoidable consequence of the new hypothesis. By it, light denuded of caloric, emanates from the sun's atmosphere, and flies in every direction, whether it goes one hundred miles, ninety-five millions, or one hundred billions of miles, its component parts must remain the same, until a proper medium of combination offers, and then, *heat* must be the inevitable result.

The fixed stars are suns, by the Doctor's own admission; their bodies must be opaque; but since they emit light, it must, like the solar light, be self-created; their atmosphere must, of course, be luminous and phosphoric, and, consequently, their light similar to the sun's. And, although that light traverses an immeasurable distance, it is yet unchanged when it reaches our atmosphere, and ought then to produce heat, on entering our denser strata.

But it may be said that the rays, sent by each individual star, are not sufficient to effect any change of temperature. Granting this, it cannot be denied that we receive, at the same moment, millions of millions of rays from the innumerable stars which adorn the firmament, and that their aggregate quantity must, at least, equal the sun's emanations to us, and ought, in consequence, to generate as much heat. Is not this a fair and natural deduction from the premises?

4. Since the *cold rays* disengage heat from our atmosphere, how does it happen that the moon's rays, coming through the same medium, (the generating medium,) do not produce a similar effect? Because, it will be immediately answered, it is a mere reflected light. Hence, we must admit two kinds of light—the sun's primitive light, and the moon's reflected, or secondary light. How do they differ? As long as the sun's rays were supposed to contain light and heat, it was natural to infer that, the heat being absorbed by the body of the planet, the reflected light could no longer retain it, and, of course, it was cold; but when the solar rays are, by the new system, deprived of caloric, being cold, how can they differ from the light of the planets? This is not explained by the Doctor.

Since we have no light of our own, if we reflect any, it must be the sun's. This will be readily conceded; but it may be said that it will be the sun's light, modified in its passage through our atmosphere. Let us examine this objection. The only modification light undergoes, is the accession of caloric. Hence, if the earth sends forth any light, it must be *heated light*; and, since there is nothing to interrupt its course between the moon and us, it must reach our satellite as it leaves us, viz: loaded with heat. We must then impart a considerable degree of heat to the lunar inhabitants.

What we have just said of the earth, and its reflected rays, is applicable to the moon, and to every other planet. Hence, their light ought to convey heat to us.

The consequence from the Doctor's premises would be, that the earth and planets send forth *calorific rays*, while the sun transmits *cold rays*. Such is the absurd, though inevitable deduction, the new theory would lead to—a conclusion wholly contrary to experience;

for the most accurate observations have proved that rays from the moon and planets produce no sensible heat on the earth.

If these inferences are correct, it is evident that the Doctor's hypothesis is erroneous, and that we must either re-adopt the old received idea of the sun being a mass of ignited matter, or else, admitting, with the celebrated astronomer, that light issues, not from the sun's nucleus, but from its lucid and phosphoric atmosphere, endow that light with heat, and then form some new conjecture or solution to explain why the solar rays do not heat the upper part of our atmosphere.

That solution appears almost self-evident, from the theory of atmospheric pressure in Turner's Elements of Chemistry, with notes, by the distinguished Professor, Franklin Bache, (page 153, 4th American edition.)

Information to persons having business to transact at the Patent Office.

DEPARTMENT OF STATE, }
September 30th, 1834. }

The Acts of Congress, of a general nature, which relate to Patents for Inventions and Improvements in the Useful Arts, are those of February 21st, 1793; April 17th, 1800; February 15th, 1819; July 3d, and July 13th, 1832.

Patents are granted for "any new and useful art, machine, manufacture, or composition of matter, or any new and useful improvement on any art, machine, manufacture, or composition of matter, not known or used before the application." [Act of 1793, sec. 1.]

The term for which a Patent is granted, is fourteen years. A patent cannot be prolonged or renewed beyond that term, except by a special Act of Congress.

Patents may be granted to *citizens* of the United States. [Act of 1793, sec. 1.] to *aliens* who shall have resided therein for two years, [Act of 1800, sec. 1.] and to *aliens* "who, at the time of petitioning for a Patent, shall be resident in the United States, and shall have declared their intention, according to law, to become citizens thereof." [Act of July 13th, 1832, sec. 1.]

A Patent granted to an alien of the description last mentioned, will be void, if the invention is not introduced into public use in the United States within one year; or if, for any period of six months after such introduction, it shall not continue to be publicly used and applied in the United States; or if the inventor shall fail to become a citizen of the United States at the earliest period at which he may be entitled. [Act of 13th July, 1832.]

Joint inventors are entitled to a join patent: but neither can claim one separately.

A Patent obtained surreptitiously, or upon false suggestion, will be set aside upon application to the proper court. [Act of 1793, sec. 10.]