

Art thou, my Gregory, for ever fled!
And am I left to unavailing woe!
When fortune's storms assail this weary head,
Where cares long since have shed untimely snow,
Ah! now for comfort whither shall I go!
No more thy soothing voice my anguish cheers:
Thy placid eyes with smiles no longer glow,
My hopes to cherish, and allay my fears,—
'Tis meet that I should mourn—Flow forth afresh
my tears!" *

* Beattie's *Minstrel*, second Book, concluding stanzas.

*On the KNOWLEDGE of the ANCIENTS respecting
GLASS, with a SKETCH of its HISTORY down
to later TIMES. By Dr. FALCONER. Read
December 17, 1783.*

Ante Christum,
Ann. 440.
Herodotus.

HERODOTUS is, I believe, the
most ancient writer, in whom
the word *ὑαλος*, which is generally
understood to signify glass, occurs. He says,
that "the Æthiopians surrounded the dead
bodies of persons of high rank, after being pre-
viously embalmed, with a case of glass; which
substance, he adds, is dug up there with ease,
and in plenty. The dead body, he says, appears,
in

in the middle, through the transparent covering, neither emitting any ill scent, nor being otherwise disagreeable."* It appears, plainly, that artificial glass could not be meant here, nor as I should conjecture, rock chrystal, but in all probability somewhat of the talky kind or lapis specularis, which might easily be framed, in such a manner, as to form a convenient transparent case, such as is here described.

A. C. 400. The next writer, in point of time, Aristophanes. that takes notice of glass is, I believe, Aristophanes, who, in the first scene of the second act of his Comedy of the Clouds, introduces Strepsiades an old Man, much in debt, informing Socrates of a method he had discovered of annulling his own debts.

"You have seen, says he, among the druggists or perfumers, a stone which is beautiful and transparent, and used to kindle fire. Do you mean glass? answers Socrates. I do, replies the other. What will you do with it? says Socrates. When, the other answers, the Scribe shall have

* Μετα δε ταυτην, τελευταιας εδησαντο τας θηκας αυτων, αι λεγονται σκευαζεσθαι εξ υελου, τροπω τοιωδε. Επεαυ τον νεκρον ισκηνηωσι, ειτε δη καθαπερ Αιγυπτιοι, ειτε αλλως πως, γυψωσαιτες απαντα αυτον, γραφη κοσμεουσιν, εξομοιουντες το ειδος ες το δυνατον. επειτα δε οι περιισασι σιληην εξ υαλου πεποιμηνην κοιλην. η δε σφι πολλη κ' ευερος ορυσsetαι. εν μηση δε τη σιληη ενων διαφαινεται ο νεκος, ουτε οδμην ουδεμην ακαριν παρεχομενος, ουτε αλλο αεικες ουδεν. κ' εκει πανταφανερα ομοιως αυτω τω νεκυι. Herod. L. III.

written out the process, I, taking this in my hand, and standing in this manner at a distance, opposite to the Sun, may melt or consume the letters of the writing.” *

We are not, indeed, certain that artificial Glafs is here understood, as the word *γυαλος* is said to signify chrystal also.

It is not, however, at all improbable that glafs may be here meant, as it will be shewn, that the making of it was well understood, not many years afterwards. If this be the sense of the passage, the manufacture must have been brought to considerable perfection, as the glafs, used for this purpose, must have been very clear, and adjusted by grinding to a proper form for concentrating the sun’s rays, and moreover highly polished.

From the expression (*προς τον ηλιον*), it might seem that a speculum was used, since the translators render it (*adversus solem*) opposite to the sun; but it may as well be rendered (*inter*) between, and then it agrees with the operation of a lens, which, it is plain, this was, from his calling it

* Στρ. Ηδε παρα τοις φαρμακοπώλαις την λιθον ταυτην εώρας την καλην, την διαφανη. αφ’ ης το πυρ α’πτεισι; Σω. την υαλου λεγεις; Στρ. Εγωγε. Σω. Φερε τι δητ’αν? Στρ. Ειταυτην λαβω, οποτε γραφοιτο την δικην ο γραμματευσ, αποτερω σιλας ωδε προς τον ηλιον, τα γραμματα εντηξαιμι της εμης δικης.

Aristoph. *Nubes*, Act II. Scene I.

διαφανη, or transparent.—Aristophanes,* in other places, mentions glass cups, as used for the purposes of drinking.

A. C. 340. Aristotle. Aristotle has two problems, relative to glass. The first endeavouring to explain its transparency, the second, its want of malleability. But the learned think them both to be spurious. There is, however, no

A. C. 303. Theophrastus. doubt, that Theophrastus, the immediate successor of Aristotle, was well acquainted with glass. He describes it as being made of the sand of the river Belus, † which was called *βελις*, to which he adds, that the commonest kinds were mixed with copper. The

A. C. 209. Archimedes. celebrated sphere of Archimedes, ‡ if truly described, is a remarkable instance of the perfection to which the art of making glass had been brought, at an early period,

* *Επιον ο μιν εξ υαλινων εκποματων.* Aristoph.

† *Ει δε βελος εκ της βελιδος ως τινες φασι η αυτη πυκνωσει γινεται ιδιωτατη δε η τω χαλκω μιγνυμενη.* Theophr.

Ita (*βελις* scilicet) vocant arenam vitro conflando idoneam, quæ in Beli amnis ripis & alveo reperiebatur.

Salmasius. Plin. Exerc. p. 773,

‡ An Archimedes Siculus concavo ære similitudinem mundi, ac figuram potuit machinari, in quo ita solem, ac lunam composuit; ut inæquales motus & cælestibus similes conversionibus, singulis quasi diebus efficerent: & non modo accessus solis, & recessus, vel incrementa, diminutionesque lunæ,

period, as well as of great ingenuity in the mechanism and execution of the instrument itself. It seems to have been a kind of orrery or planetarium, in which the sun, moon, and planets, were not only represented in their proper places,

lunæ, verum etiam stellarum vel inerrantium, vel vagarum dispares cursus orbis ille dum vertitur, exhiberet?

Lactant. Lib. II. De Orig. Erroris.

Hic est ille noster, cujus ingenio sphaera fabricata, cæli lapsus, & omnium syderum cursus, exemplo divinæ imitationis ostendit.

Jul. Firmic. L. VI. Cap. 31.

Claudiani Epigramma in Sphæram Archimedis.

Jupiter in parvo cum cerneret æthera vitro,

Risit, & ad superos talia dicta dedit:

Huccine mortalis progressa potentia curæ?

Jam meus in fragili frangitur orbe labor.

Jura poli, rerumque fidem, legesque Deorum

Ecce Syracosius transtulit arte senex.

Inclusus variis famulatur Spiritus astris,

Et vivum, certis molibus urget opus.

Percurrit proprium mentitus signifer annum,

Et simulata novo Cynthia mense redit.

Jamque suum volvens audax industria mundum,

Gaudet, & humanâ sidera mente regit.

Quid falso infontem tonitru Salmonea miror?

Æmula naturæ parva reperta manus.

Nam quum Archimedes lunæ, Solis, quinque errantium motus in Sphærâ illigavit, effecit idem quod ille qui in Timæo mundum exædificavit Platonis Deus, ut tarditate & celeritate dissimillimos motus una regeret conversio.

Cicer. Tusc. Quæst. Lib. I.

according to the astronomical ideas that then prevailed, but also made to move in their orbits according to their different degrees of velocity. The meridians, the zodiac, with its signs, and other great circles of the heavens, together with the rise and setting of the stars, were all expressed. The whole of this curious mechanism, was inclosed in glass, and seems to have been in form of a sphere. Whether the celestial circles, together with the fixed stars, were delineated on the outer glass covering, which might be made to revolve round the rest of the planetary system, like that described in the first volume of Dr. Long's *Astronomy*, and the print of it prefixed to the title of that book; or whether it was constructed in any other manner, is not clear. It must, at any rate, have been a surprising piece of mechanism.

A. C. 105. Lucretius was undoubtedly well acquainted with glass, and its properties. In his fourth book, he remarks the difference between sounds, and the images of objects. The former passing through any openings however curved or winding, * whilst the latter are broken and confused, if the passages,

* ----- Vox per flexa foramina rerum
Incolumis transire potest, simulacra renutant.
Perseinduntur enim, nisi recta foramina tranant,
Qualia sunt vitri, species quæ travolat omnis.

Lucret. L. IV. Lin. 603.

through which they come, be not direct or rectilinear.

This, though only true, with some limitations, shews him to have had no inconsiderable knowledge of the nature of the subject in question.

A. C. 39. Virgil,* when he means to commend the clearness of the Fucine lake, compares the water of it to glass; a circumstance which shews the clear kinds of glass to have been well known in his time.

A. C. 36. Horace† is more express, and mentions glass in terms, that shew its clearness and brightness to have been brought to great perfection. In particular, he compares the fountain of Blandusia to glass, and says it was even brighter than that substance; an expression that carries great force, no glass at present possessing that quality, in a higher degree, than some spring waters.

Post
Christum.
A. D. 27.
quo Strabo
obiit.

In the time of Strabo, the making of glass was undoubtedly well understood, and had become a great article of manufacture, as appears from the following account given by this author:

* Vitreâ te Fucinus undâ

Te liquidi flevire lacus.

Virg. *Æneid.* VII. 759.

† Perlucidior vitro.

Hor. *Carm.* III. Ode II.

Splendidior vitro.

Hor. *Carm.* III. Ode XIII.

“Between Ace, (or Ptolemais) and Tyre, the shore abounds with small eminences, which are composed of a vitrifiable earth. They say, however, that it is not melted there, but brought to Sidon to undergo that operation. Some say, that the Sidonians have a vitrifiable sand fit for fusion; others say the sand which is commonly found, is used for that purpose. I, myself, have heard (says Strabo) from the manufacturers of glass at Alexandria, that there is a certain vitrifiable earth in Egypt, without which, the most magnificent, and variously coloured pieces of manufacture cannot be made, as the different kinds of glass require different mixtures of ingredients. Many discoveries also were made at Rome, both with regard to the beauty of the colour, and also as to the facility of execution, especially in those kinds of glass that are made to resemble chrystal.”

Seneca* was not only well acquainted with glass as a substance, but also understood its magnifying powers when formed into a convex shape.

A. D. 65. A glass globe, says he, filled with
 Seneca water, makes letters viewed through
 Mors. it, appear larger and brighter. The
 magnifying power of glass considered as a more dense, and of course a more refrangible medium than air, was not unknown

* Literæ quamvis minutæ & obscuræ per vitream pilam aquâ plenam majores clarioresque cernuntur.

Senec. Quæst. Natur. I. 6.

to him. Fruits, * says he, viewed through glass, appear much larger, and more beautiful. The stars also appear magnified in a humid atmosphere. If a ring be put into a bowl of water, and viewed there, it seems to approach to the eye, or in other words, is magnified; which the same author observes, is the case with every body that is viewed through a fluid. Seneca† says here expressly, that water, as a medium, has the same effect with glass. It is worthy remark, that the effect of the prism in exhibiting the original colours that are combined in light, was a fact well known in the time of Seneca; and from his expression, we may conjecture the experiment to have been frequently practised. “A rod of

* *Poma per vitrum aspicientibus multo majora sunt.*

Senec. Quæst. Nat. I. 3.

† *Poma formosiora quam sint videntur, si innatant vitro. Sidera ampliora per nubem aspicienti videntur: quod acies nostra in humido labitur, nec apprehendere quod vult fideliter potest. Quod manifestum fiet, si poculum impleveris aquâ, & in id conjeceris annulum. Nam cum in ipso fundo jaceat annulus, facies ejus in summo aquæ redditur. Quicquid videtur per humorem longe amplius vero est. Quid mirum, majorem reddi imaginem Solis, quæ in nube humidâ visitur, cum de causis duabus hoc accadat: quia in nube est aliquid vitro simile quod potest perlucere, est aliquid & aquæ, quam si nondum habet, tamen jam apparet ejus Natura, in quam ex suâ vertatur?*

Senec. Quæst. Natur. L. I. C. 6.

glafs, * says he, is commonly made, drawn out, or swelling with many angles in form of a club : this, says he, if the rays of the sun fall upon it in a transverse direction, exhibits the same colours as we are accustomed to see in the rainbow." This curious passage has not been sufficiently attended to by the commentators.

Petronius Arbiter, in his account of A. D. 66. the feast † of Trimalcio, makes him Mors. Petronii. relate a story of "an artificer, who could make vessels of glass of such a degree of tenacity as not to be more liable to be broken than if made of gold or silver. Having made a drinking cup of the purest glass of this kind, which he thought no one worthy to possess but the Emperor, he was admitted into his presence, in order that he might offer this specimen of his ingenuity for the Emperor's acceptance. The nature of his present met with praise; the hand of the artificer was commended, and the respect he shewed by it, found a favourable reception. The artist, however, being desirous to heighten

* *Virgula solet fieri vitrea, stricta, vel pluribus angulis in modum clavæ torosa; hæc si ex transverso solem accipit, colorem talem qualis in arcu videri solet, reddit.*

Senec. Quæst. Natur. Lib. I. Cap. 7.

† This passage from Petronius is to be found in Joannes Sarisburiensis.

Polycrat. L. IV. Cap. 5, and literally translated.

their

their admiration into surprize and astonishment, and to conciliate more effectually the favour of the Emperor, requested the cup again from his hand; and having received it, threw it with all his force upon the pavement in so violent a manner, that it could not have escaped injury, had it been made of the most solid and uniform brass. The Emperor, at the sight of this action, was no less astonished than concerned; but the artist taking up the cup from the ground, which was not broken, but only bruised by the blow it received, which had the same effect upon it as it would have had if the cup had been made of copper; and drawing forth a hammer from his bosom, repaired the bruise that the glass had received, by hammering it with frequent strokes, much in the same way as if the cup had been of brass. The expectations of the artificer were much raised by the success of this operation, which had introduced him to the knowledge of the Emperor, and procured him general admiration; but the event turned out different from what he imagined; for the Emperor enquiring of him, if any one else was acquainted with the secret of preparing glass in such a manner; and he answering in the negative, his head was ordered to be struck off, the Emperor assigning for a reason, that if this secret should be made publick, gold and silver would lose their value, and become of no more estimation than clay."

It is difficult to guess what the composition of the substance here called glass could be. It certainly could not be any vitrified body as such are universally brittle. Some have thought it to have been the luna cornea, or the calx of silver, made by the dissolution of that metal in the acid of nitre, and its precipitation by that of salt. But this, though endued with considerable flexibility and tenacity, is not malleable to the degree here represented.

Pliny, however, appears to have left
A. D. 77. us the most complete information con-
Plinius cerning glass. He mentions it as be-
obit. ing of Phœnician origin, as many other
great discoveries have been. It was first made of sand found in the river Belus, a small river of Galilee, running from the foot of Mount Carmel, out of the lake Cendevia. The part of the shore where the sand was dug, did not exceed 500 paces in extent, and had been used many ages before, for the same purpose. The report of its discovery was, that a merchant ship laden with nitre, or fossil alkali, being driven upon the coast, and the crew going ashore for provisions, and dressing their victuals upon the shore, made use of some pieces of fossil alkali to support their kettles. By these means a vitrification of the sand beneath the fire was produced, which afforded a hint for the manufacture. In process of time the calx of iron, in form of the magnetical stone, came

came to be used along with the fossil alkali, from an idea of its not only containing iron, but glass in a liquid form. Clear pebbles, shells, and fossil sand, were also in many places employed for the same purpose. It is said, that in India, pieces of native chrystal were used for that purpose; and on that account, the Indian glass was preferred to any other. He adds, that light and dry woods were used for the melting of glass; to which they added copper from the island of Cyprus, and the fossil alkali, especially that which is brought from the East Indies. The furnaces are kept burning without intermission, that the copper may be melted with the glass, and out of this compound are made masses of a coarse blackish colour. These lumps or masses are again melted, and tinged of the colour required. Some of these pieces are brought to the shape desired, by blowing it with the breath: some are ground in a lathe, and others are embossed in the same manner with silver. Sidon was formerly famous for these manufactures, as specula or looking glasses were first invented there. The above is described by Pliny, as the ancient method of making glass. In his time, it was made with sand found at the mouth of the river Vultur-nus, upon the shore, for six miles between Cumæ and the Lucrine Bay. This sand was very fine, and was ground to powder with a ball or sphere, and
a mill

a mill. It was then mixed with three parts of the fossil alkali, either by weight or measure; and being fused, was conveyed in a liquid state into other furnaces, where it was formed into a mass called ammonitrum (or sand combined with the fossil alkali), which mass was melted, and became then pure glass, and a mass of white vitrified matter. The same method of making it, prevailed in Spain and Gaul. Glass was likewise made to imitate the lapis obsidianus, a substance found by a person of the name of Obsidius, in Egypt and Æthiopia. It was of a very black colour, yet obscurely transparent, and often placed among specula, in the walls of rooms, to reflect the shadow of objects. It was also used for the same purpose as gems (I apprehend for engraving upon) and even for statues, Pliny mentioning, that he saw solid statues of the Emperor Augustus, made of this material; and the same Emperor dedicated four elephants made of the same substance in the Temple of Concord. It appears to have been used from great antiquity, since Tiberius Cæsar, when he governed that country, found a statue of Menelaus, made of it. In the time of Pliny, the artificial imitation of it by glass, seems to have been in use instead of the native material. Pliny seems to intimate, that the black colour given to the glass that was made to imitate the lapis obsidianus, was produced

duced by some colouring ingredient.* But many stones commonly found, as the gray rag stone, the blue whin stone, the Derbyshire toad stone, and the Westmoreland slate, will all melt into a vitreous mass of a black colour. I was informed by his Grace the late Duke of Northumberland, whose knowledge in chemistry, and natural history, was very extensive, that he once procured a pot of glass to be made at the Glasshouse at Newcastle upon Tyne, of the whin stone. The glass produced from it, was of a fine black colour, and good uniform texture, and easy fusion; but inconvenient to be used for bottles, on account of its having scarcely any transparency. He likewise added, that it exactly resembled some specimens of what was imagined to be the ancient lapis obsidianus.

The Romans had likewise an opaque red kind of glass, used for plates and dishes for the table, called hæmatinon, one of various colours called myrrhinum, a white, a clear red, a blue, and indeed most other colours. Pliny observes of it, that no substance was more manageable in receiving colours, or being formed into shape than glass.

The perfectly clear glass, which bore the greatest resemblance to chrystal, was, however, most valued. Nero gave for two cups, with two

* Plin. Hist. Nat. L. XXXVI. Cap. 26.

handles to each, and of no extraordinary size, six thousand sesteritia, or nearly fifty thousand pounds sterling. But although the finer kinds appear to have been so rare and valuable, the inferior kinds must have been not uncommon, since Pliny says, that the use of glass cups had nearly superseded those of gold and silver.—Pliny likewise knew the power of a hollow glass globe, filled with water, in concentrating the rays of light, so as to produce flame in any combustible substance upon which the focus fell; and also mentions, that some surgeons in his time, made use of it as a caustic * for ulcers. He was likewise acquainted with the comparative hardness of gems and glass, as he observes, that the lapis obsidianus would not scratch the true gems; and † he also mentions the counterfeiting of the latter in his time, as a very lucrative art, and brought to great perfection. The same author mentions, that glass might be cut or engraved upon by means of diamonds, which art is evidenced by the antique gems so frequently found.

The ruins of the city of Pompeia, which was destroyed in the time of Pliny, have
 A. D. 77. afforded examples of the use of glass in windows. I was informed by a gentleman of accuracy, that he had measured a pane of glass

* L. XXXVII. Cap. 2.

† L. XXXVII. Cap. 13.

found in a window there, and it amounted to eighteen inches long, by about fourteen wide.

The* inspired writer of the Apoc-
 A. D. 94. calypse, describing the brightness of
 St. John the one of the appearances in his vision,
 Evangelist. calls it "a sea of glafs, like unto
 chryftal."

Josephus† the Jewish historian says,
 A. D. 83. that "near the monument of Memnon,
 Josephus. which lies on the river Belus in Ga-
 lilee, there is a place an hundred cubits in
 extent, worthy admiration. It is (adds this
 writer) round and hollow; and although it be ex-
 hausted by the numerous ships that touch there,
 it is soon filled again; the winds as it were, by
 design, tearing up the white sand from other
 places, and bringing it hither, and the mine
 itself, has the power of changing the sand that is
 thus carried into it, into glafs; and what seems
 to me more extraordinary, the glafs that over-

* Θαλασσα υαλινη ομοια κρυσταλλω. Apoc. C. 4. V. 6.

† Του δε ασιως απο δυω σταδιων ο καλουμενος Βηλεος ποταμος πα-
 ραρρει πανταπασιν ολιγος, παρ ὧ το Μεμνονος μνημειον εστιν, εχον
 εγγυς αυτου τοπον εκατοντα πηχην θαλασσης αξιον, κυκλοτερης μεν
 γαρ εστι και κοιλος, αναδιδωσι δε την υαλινην θαλασσαν, ην οταν
 εκκενωση πολλα πλοια προσχοντα, παλιν αναπληρουται το χωριον
 κατασυροντων μεν ωσπερ επιτηδες τοτε τον ανεμων εις αυτο την εξωθεν
 αργην θαλασσαν, του δε μεταλλου πασαν ευθεως μεταβαλλοντος εις
 υαλον, θαλασσιωτερον τουτο μοι δοκειν, το την υπερχυθεισαν υαλον,
 παλιν γενεσθαι θαλασσαν εικαιαν. Josph. L. II. C. 10.

flows

flows from this place, becomes again common sand." It is evident, that Josephus here, by the word *υαλος*, means only the sand fit for the making of glass.

In the time of Martial, glass was not
A. D. 84. only brought to great perfection, and in
Martial. common use * for drinking vessels, but was also employed (as it seems) for † bottles in which wine was kept, and likewise for ‡ pots to hold flowers.

A few words on the antiquity of the term (glass) may not in this place be improper. Tacitus and Pliny § inform us, that amber was called among the ancient Gauls and Germans, by the name of *glesum* or *gleffum*; and from the similitude which glass bore to amber in point of

* Nos bibimus vitro, tu myrrha Pontice, quare?
Prodat perspicuus ne duo vina calix.

Martial Epig. L. IV. Ep. 86.

† Condantur parco fusca falerna vitro. L. II. Epig. 40.

‡ Condita sic puro numerantur lilia vitro.

L. II. Epig. 22.

§ Succinum quod ipsi gleffum vocant inter vada atque ipso in litore legunt. Taciti German. C. 45.

Certum est gigni in insulis septentrionalis Oceani & a Germanis appellari gleffum itaque & a nostris unam insularum ob id gleffariam appellatam.

Plin. Hist. Nat. Lib. XXXVII. Cp. 3:

transparency

transparency and brightness, * it acquired a name which was in all probability, originally the same.

The word *glesum* implied no doubt a shining or transparent substance; *gleissen* expresses at present in the German language, to shine; and our English word to *glisten* is derived from it, and has nearly the same signification. Du Cange † says, that some critics were of opinion, that the word *glesum* itself, implied glass rather than amber. It is farther remarkable, that the ancient Greeks applied the same term (Ηλεκτρον), || both to glass and amber.

The herb wherewith the Britons painted their bodies, went also under the name of

* Antiquis Germanis fuisse *gleffum* auctores sunt Plinius atque Tacitus quamquam apud hunc perperam legitur *glesum* unico s̄ nam ipsis Germanis fuit *glefs* quo vocabulo postea paulum variato in *glass* vitrum quum id novum atque antea inusitatum Germaniæ inferretur interpretati sunt ob similitudinem quandam

Cluverii Germania Antiq. L. III. Cap. 44.

Inde hodie fortasse vitrum glassum appellant nam succinum vitream habet perspicuitatem.

Salmas. Comm. in Solin. p. 165.

† Censent quidam *gleffum* nihil aliud esse quam quod Anglo Saxones *glaf* Galli, Germani & Angli *glase* vocant.

Du Cange Glos Vox Glessum.

|| Certe Ηλεκτρον mentio apud Homerum non γαλου.

Salmas. Plin. Exerc. p. 773.

Homero & aliis antiquis nomen γαλας notum non fuisse sed pro eo Ηλεκτρος dici. Budæi Lexicon Vox Ηλεκτρον.

glastum,* perhaps from the shining appearance it might give to their skins, or possibly because its ashes might be used in the making of glass. The Romans called the same plant by the name of *vitrum* †, the word they used to signify glass.

Galen makes mention of glass in A. D. 143. several parts of his works. ‡ He appears to be well acquainted with it, and the method of making it. He tells us, that it was made from sand melted in furnaces, which was required to be pure, since if any metallic substance was mixed therewith, the glass was spoiled. Those concerned in the manufacture, knew by looking at the sand if it was fit for this purpose. In other places, he advises medicines of a corrosive nature to be kept in glass vessels, as such are not liable to be corroded, or to impart any bad qualities. Glass was also used for cupping glasses in his time, much in the same way as at present.

* Simile plantagini *glastum* in Gallia vocatur, quo Britannorum conjuges nurusque, toto corpore oblita, quibusdam in sacris & nudæ incedunt, Æthiopum colorem imitantes.

Plin. Lib. XXII. Cap. 1.

† Omnes vero se Britanni *vitro* inficiunt quod cæruleum efficit colorem, Cæs. Bell. Gall. L. V.

‡ De Simpl. Medicam. facultate. Lib. IX. De Terrâ Samia. De Antidotis. Lib. VIII. Cap. 8. De compos Pharm. secund. loc. L. VIII. Cap. 5.

Apuleius

A. D. 161: Apuleius. Apuleius mentions the manufactory of glass cups in his time, as highly worked and carved in various ways, and of great value.

A. D. 214. Alexander Aphrodisiensis. Alexander Aphrodisiensis, a Greek writer, and a commentator on Aristotle, has several remarks on glass* relative both to its brittleness, especially on change of temperature, and its transparency.

The manufacturers of glass seem to have been erected into a kind of Company at Rome, and to have had a street assigned them, which was in the first region or division of the city, near the Porta Capena. †

A. D. 220. Alexander Severus, ‡ which subsisted in the time of Aurelian, || and probably long after.

The first author that I find, who makes mention of glass in windows, though there is no

* Αἱ υἱοὶ ἐν τῷ χειμῶνι θερμῶς σφοδρὰ τινος ἐμβληθόντος ἐξηγνύονται. Alex. Aphrod. probl. I.

Ὡς περ δὲ υἱοῦ ἐμφαίνει τὸ εὐανθὲς τοῦ χρώματος. Alex. Aphrod. ex. Steph. Thesaur. Græc. vox ὕαλος.

† Sextus Rufus in descript. urb. Romæ.

‡ Ælii Lampr. Alex. Severus.

|| Vopiscus Aurelianus.

doubt it was in use for this purpose
 A. D. 320. *pre*, is Lactantius, * who speaks in
 Lactantius. *ess* terms of glass being used as a
 transparent substance in windows, for
 which it appears to have been in common use
 together with the lapis specularis.

St. Jerome† likewise speaks of
 A. D. 422. glass windows formed of glass,
 Hieronymus melted and cast into thin plates,
 obiit. At. 91. being in use in his time.

Paulus Silentarius,‡ a poet and
 A. D. 534. historian of the sixth century, who
 Paulus Silen- wrote in verse a description of the
 tiarius. church of Sancta Sophia at Constan-
 tinople, speaks of the brightness of the sun's rays
 at its rise, coming through the eastern windows
 of that church, which were covered with glass.

* Manifestius est mentem esse quæ per oculos ea quæ sunt
 opposita transpiciat, quasi per fenestras lucenti vitro aut
 speculari lapide obductas.

Lactant De Opific Dei. Cap. 5.

† Vitrearum fenestrarum mentio apud Hieronymum quæ
 vitro in tenues laminas fuso obductæ erant.

Salm. Plin. Exerc. p. 771.

‡ ————— δοχεια φωτος ανοιγει
 Λεπταλαις νελοις κεκαλυμμενα, των δια μεσσης,
 Φαιδρον αναστραπτουσα φαισφορος ερχεται ηως.

Gregory

A. D. 571.
Gregory of
Tours.

Gregory of Tours† describing the ravages of war, makes frequent mention of the devastations committed on the windows of the churches.

A. D. 571.
Fortunatus.

Fortunatus† likewise, who was contemporary with Gregory of Tours, and also bishop of Tours and Poitiers, wrote a poem on the church at Paris, where he describes the light coming through the glass windows, as one of the principal circumstances that contributed to its beauty and ornament.

A. D. 630.
Johannes
Philoponus.

Johannes Philoponus‡ the philosopher, who lived according to Helvicus, about the year 630, but according to Hoffman, a century earlier, not only speaks of glass, but of the panes being fastened in with plaister, much in the same way as at present.

* Ascendentes per eum, effracta vitrea ingressi sunt.

Gregor. Turon. Lib. VI. C. 10.

Effractis cellulæ vitreis hastas per parietis fenestras injiciunt. Ibid. L. VII. C. 29.

Si aliud inquit invenere non possum vel has ipsas quas cerno vitreas auferam. Lib. I. Miracul. C. 29.

† Prima capit radios vitreis oculata fenestris,
Atificisq. manu clausit in arce diem.

Fortunatus. Lib. II. Poem 11. De Eccles. Parisiac.

‡ Λαμπτήρας νοίει η τα υείλια α δια της γυψηπια σλικης τεκνης επιτιθενται ταις οικιας χαριν του φωτιζεσθαι ταυτας. Phil. 11.
post Analecta citat a Salm. Plin. Exerciet, 771.

St. Audoen the bishop of Rouen,
 A. D. 651. in his history of the life of his con-
 St. Audoen, temporary St. Eligius, the bishop of
 Noyon, * mentions a miraculous appearance in
 form of an arch or bow, about the great glass
 windows of a certain church.

The venerable Bede † relates also,
 A. D. incert. that about the middle of this cen-
 tury, the art of making glass was brought into
 England by Benedict an Ecclesiastic, the minister
 of Osway, the king of Northumberland.

Thomas Stubbs, however, in his
 A. D. 726. account of the prelates that have
 Wigfred succeeded to the See of York, says,
 bishop of succeeded to the See of York, says,
 Worcester. that Wigfrid, bishop of Worcester, ‡
 brought first into Britain the art of making glass
 windows, which is inconsistent with what is re-
 lated by Bede.

Leo Ostiensis || speaks of the win-
 A. D. 760. dows in his time being made with
 Leo Ostiensis. glass plates fixed in lead, and fastened

* Apparuit subito in pariete circa vitroam maximam ve-
 luti arcus in rotundo. Vita Sanct. Eligii. Lib. II. Cap. 45.

† Chronicon Ranulphi. Higdeni. Ed. Gale. Vol. I.
 p. 235.

‡ Vide etiam Bedam de Wiremuthense monasterio. L. I.
 C. 5. de vitreis fenestris.

|| Fenestras plumbo simul ac vitro compactis tabulis fer-
 roque connexis inclusit. Leo, Ost. L. III.. C 27.

together with iron, much as we see them at present.

A. D. 800.
Anastasius. Anastasius * an historian of Rome, who was librarian to the Pope, mentions, that in the Pontificate of Leo III. who became Pope about the year 800, painted glass in windows was in use. The same writer describes four large glass ornaments of the penfile kind, that were hung up in the church of St. Clement the martyr, weighing fifty pounds.

A. D. 1156. The statutes of the church of Tra-
guier,† in Lower Britany, in the 12th century, speak of the windows of churches and chapels being ornamented with arms, and military ensigns, painted upon the glass in them.

* Hoffm. Lexic. Vox Fenestra.

Idem fecit prædictus præsul in Ecclesia beati Clementis Martyris atque Pontificis, Regnum quod pendet supra altare majus ex auro purissimo sculptile sine gemmis habens in medio crucem de Auro cum gemmis fixis in eadem cruce. Vitreas quinque & quæ pendent item Vitreas numero quatuor pensantes libras quinquaginta.

Anast. in Vitâ Leonis IV.

† Qui fenestras ecclesiarum & capellarum dictarum nostrarum civitates & diocesis aliquando devotione aliquando ambitione & superbia vitrare & vitris hujus modi arma & signa depingi faciunt prætenduntque per appositionem & picturam armorum & signorum hujus modi vitra memorata, &c. Stat. Eccles. Trecor. A. D. 1156.

A. D. 1156. Sugerius* abbot of St. Denys, the minister of Lewis VII. speaks of a glass window being presented to the church at Paris, by Barbedaurus the dean, that cost fifteen pounds, which is upwards of 47 pounds sterling intrinsic value, exclusive of the alteration occasioned by the present relative plenty of money.

A. D. 1309. It appears from a charter in the beginning of the fourteenth century, that a glass cup was then valued at a denarius, ‡ or about threepence halfpenny sterling, intrinsic value, exclusive of the alteration in the relative value respecting the present time.

A. D. 1338. † A short time afterwards, there appears a charter of stipulation for the erection of a glass-house, to be kept up constantly and worked.

* Obiit Barbedaurus Decanus & Sacerdos qui fecit fieri vitream quindecim libris comparatam.

Suger Lib. De Admir. sua. Cap. 29.

‡ Item a quolibet verrerio exponente vitros suos ad vendendum levatur unus vitrus vel unus denarius quod verrierius maluerit. Du Cange Vox Verreries.

† Pactis infra scriptis videlicet quod infra dictum nemus dictus Guionetus faciat domum fortem & ibidem debeat habitare & verreriam ibidem facere tenere & operari facere in ea perpetuo opus vitrorum sive vitrei.

Du Cange Vox Verreria.

In

A. D. 1364. * In the year 1364, there was a street in Paris, called from this manufactory.

† A charter of Richard II. of England, A. D. 1386. quoted by Rymer, about the same period, speaks of glass, and the manufactures of it for windows.

* *Transtulerunt domino dicto regi unam domum sitam Parisii in vico vitreria.* Du Cange *Vox Vitreria.*

† Cum quædam capella reparanda existat ac de vitro & vitriatoribus pro reparatione fenestrarum & aliorum locorum ejusdem capellæ multipliciter indigeat.

Rymer's *Fæd.* Tom. VII. p 527.



Falconer, William. 1789. "Remarks on the knowledge of the ancients respecting glass, with a sketch of its history down to later times." *Memoirs of the Literary and Philosophical Society of Manchester* 2, 95–121.

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