SOME HISTORICAL NOTES ON SPECTACLES AND ON BERYLLUS*

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IN classical literature mention is sometimes made of the magnifying power of transparent media¹, but it is improbable that magnifying glasses were known in Europe before the XIIIth century. Ptolemy, who lived at Alexandria about A.D. 150, gives some details concerning lenses and discusses the course of rays of light, passing from one medium into another², but as the last part of his famous treatise on optics is lost, one cannot tell how extensive his knowledge was. It was the Arab Alhazen (about A.D. 1000) who wrote on magnifying glasses³. He describes how objects, when seen through a segment of a sphere, which has an index of refraction greater than that of the surrounding air ("grossius aere"), seem to be larger than they are in reality. This optical effect of lenses is not described in European literature before the XIIIth century. It is generally held that Roger Bacon (c. 1214-1294) was the first European scholar to mention the practical utility of lenses. In his *Opus majus* (written 1266-1267) he describes how to magnify writing by placing a segment of a glass sphere on the text with its plane side down.

But, as shown elsewhere⁴, there was another Englishman, Robert Grosseteste (1175?-1253), Bishop of Lincoln, who anticipated Bacon. In his treatise "*De iride seu de iride et speculo*"⁵ there is a passage, which can be translated thus: "... it will be perfectly clear . . . how far and how large and in what shape a body, of which the distance, size and place are known, will appear to the eye, when there is a diaphanous body, of which the distance, size and place are also known; and it is clear in what manner transparent bodies must be moulded, so that they may receive the visual rays, emanating from the eye⁶, under an angle, as wide as they wish it, and how they may collect the rays on the visible objects, whether those objects are big or small, far or near; and so they may see each visible object wherever and in any size they wish; and they may operate, that very long objects appear to be short and, in contrast, that very small and far objects are clearly visible." As far as I know Robert Grosseteste, was the first scholar in Western Europe who wrote on optics and so he deserves well of science. There was a third Englishman who had great merits in connection with optics—John Peckham (1228-1294), Archbishop of Canterbury, renowned for "*Perspectiva communis*," a book which appeared in subsequent centuries in several printed editions⁷.

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So three Englishmen, Grosseteste, Bacon and Peckham in the XIIIth century introduced modern optics in Europe.⁸

Though lenses were known before the XIIIth century, nowhere is magnifying power mentioned. Lenses had already been used as burning-glasses in ancient times. Sun-glasses are described by Pliny⁹, Lactantius¹⁰ and Macrobius¹¹. And several instances, taken from mediaeval books will be mentioned hereafter. The question: who was (or were) the inventor(s) of spectacles, need not be discussed here. Many competent scholars have treated this subject fully. Here we are concerned with the Dutch word "Bril" (spectacles) and the old French "bericle". These words are derived from "Beryllus", the name of a precious stone, which was greatly valued in ancient times¹². Trying to solve the question why our common optical instrument was called after a gem, I inquired what the classic, mediaeval and later authors, and the lexicographers have to say regarding "bril", "bericle" and "beryllus". The following notes show that there exist etymological relations between beryllus, eye, diseases of the eye and the act of seeing.

(1) *Mineralogy of beryl*. Beryl¹³ is the name applied to the precious stone including the emerald, the aquamarine and other transparent varieties known as "precious beryl", with certain coarse opaque varieties unfit for use as gems. Beryl is a silicate of beryllium and aluminium ($\text{Be}_3 \text{Al}_2 \text{Si}_6 \text{O}_{18}$). It crystallizes in the hexagonal system. The colour may be blue, green, yellow, brown, colourless or rarely pink. Rolled pebbles of beryl occur. The colour of the green varieties depends on the presence of chromoxide¹⁴. Beryl is not very hard, so it can be easily polished, but when it is exposed to the influence of other hard objects, it soon loses its brilliancy, and so it is not a material fit for lenses in spectacles. It seems that the ancients, who could not judge of the gems by chemical analysis, had a conception of beryl, different from that of modern mineralogy, and it is likely that the green variety, which is mentioned by Pliny¹⁵, was identical with what nowadays is called aquamarine¹⁶.

(2) *Etymological considerations*. A Dutch etymological dictionary (Franck's *Etymologisch Woordenboek der Nederlandsche Taal*, second edition, 1912) gives: *Beril*, Old Dutch *beril* and *berikel* (from Old French *bericle*, Middle Latin *beric(u)lus*). It is an international word derived from the Latin *beryllus*, Greek *βήρυλλος* and is connected with Sanskrit *vaidurya*, Prakrit *vērūliya* or *vēlūriya* (Old Indian *vaidūrya*).

In Arabic it was: *ballawr* or *bilaur* and in Persian *bullur*¹⁷. Concerning the word *bril* we read: Dutch *bril*, Middle High German *berille*, *barille*, *brill(e)*, New High German *brille*, Old Dutch *berille* (c. 1411)¹⁸.

There are other modifications of the word¹⁹. It will suffice to direct

attention to the fact that the French words "briller", "brillant" etc. seem to be connected with beryl, and that in a French dialect "brenicle" means: "Oeil enflammé, étincelant", "bernicles" = "yeux clignotants," "bernikas" = "personne qui porte des besicles, qui louche" etc. The Spanish "vericle" means "a steel mirror"²⁰.

Discussion

In Franck's etymological dictionary it is said that spectacles, which were invented about 1300, contained lenses which were made of beryl²¹. It may be doubted whether this be true. As far as I know, there are no such spectacles preserved. But there must have existed beryl spheres. For, as it was already stated, in nature rolled beryl pebbles occur. And medieval authors mention spherical beryls as sun-glasses²²: "De reonde taille" "Il brusle la main qui le tient contre soleil." It is said, that lenticular berylli were used as adornments on reliquaries and monstresses and the fact, that the contents of the shrines were seen magnified through those lenses, could have led to the invention of spectacles and magnifying glasses²³. In Meyer's *Konversations-Lexikon* (6th edition) it is stated, that the German word Brille is derived from Berilli, the name of "transparent pieces of stone and glass". I could not ascertain that the meaning of beryllus was so wide, but in Du Cange's *Glossarium mediae et infimae Latinitatis*, the following statement is made: "Bericlus, non lapis pretiosus, sed crystallus, nostris olim Bericle," and: "Demanda icellui Vincent quelle pierre c'estoit . . . et le suppliant dist que c'estoit *cristail* ou *bericle*"²⁴.

If it be true, that the meaning of beryllus was so wide, we can understand why the word "bril" was chosen to indicate spectacles. There is still another possibility: Some authors believe²⁵ that the first spectacles contained lenses, which had the sea-green colour of beryl. Von Pflugk²⁶ says that the glass, which was used by the first Germans, who made spectacles, was green and the lenses in antique spectacles are green. It is thus possible that spectacles received their Dutch name by analogy. Moreover it may be the merchants, who sold spectacles, pretended that the lenses were made of beryl, so that they might seem to be more precious.

Curative powers were ascribed to beryllus. In the first place it was supposed, that the green colour was beneficial to the eyes. This was already mentioned in ancient times. Pliny²⁷ tells us, how Nero looked at the performances of his gladiators through an emerald, and the same author says, that tired eyes can be restored by looking at green objects. This belief is still extant. It depends perhaps on the fact, that most men when looking at large fields and woods

receive an agreeable impression. Suchlike beliefs have often a remote origin. In this case it is perhaps connected with a very old source. According to W. J. Perry²⁸ (who refers to Donald Mackenzie) the Egyptians thought that green was life-giving because that was the colour of the Nile flood water when it first started in July²⁹.

Secondly, in old times men believed that beryl could have a pharmacodynamical effect on the eyes. Marbodius³⁰ says:—
 “Infirmis oculis in qua jacet (beryllus) unda medetur.”

That water, which has been in touch with beryl, possesses a curative power in cases of diseases of the eyes, is also suggested by the following:—

“Li eve u lavee est li pierre” (eve=water).

“Porte sante a le lumiere.”

“A l’uel, se on i a dolor” (uel=eye).

“Rent i clarte, rent i color.”³¹

And:—

“Les oil malades sainera.”

“Li vins u L’uom la laverà.”³²

Also:—

“Les iex obscurs ceste aigue esclaire” (aigue=water.)³³

And:

“Met en ses oelz de mal guerist.”³⁴

Vincentius Bellovacensis, referring to “Helinandus in Chronicis Lib. X., says: “Aqua in qua jacet pota, valet infirmis oculis,” and, according to Dioscorides: “Aqua in qua missa est, pota, valet infirmis oculis.” So the water was given by mouth.

Finally, Bartholomaeus Anglicus³⁵ mentions the curative power of the beryl: “humidos oculos sanat.” Historically there exist therefore two relations between beryllus and eye: the chromo-therapeutic and the pharmacotherapeutic action.

It seems possible, that when men first used spectacles, they believed that improvement of visual acuity was caused by the pharmacological power of the gem. This may seem odd, but we must not forget that optics was then a young science, was studied only by a few scholars; and the artisans, who manufactured the lenses were mere empiricists, who understood nothing about the theory of the course of the rays of light. And so they and their customers may have believed that the proximity of the beryl was a sufficient reason to raise visual acuity.

REFERENCES

1. SENECA, NAT.—Quaest. I, VI; (Aulus Gellius. Noctes atticae, XVI, XVIII).
2. L’Optica di Claudio Tolomeo . . . , edition Govi, 1885.
3. Opticae Thesaurus, edition Risner, 1872.
4. TEN DOESSCHATE, G.—(1940). *Ophthalmologica*, Vol. XCIX, p. 333.

5. There are existing at least Mss. of this book; four at Oxford, one at the British Museum. *Vide*: Die philos. Werke d. R. GROSSETESTE, edition L. Baur. (1912).
6. GROSSETESTE believed that we see by rays emanating from the eye.
7. "Perspectiva" means "Optics".
8. There was still a fourth author on optics; Vitello, a Pole, wrote a voluminous *Perspectiva*. Elsewhere (De derde Commentaar van Lorenzo Ghiberti etc., 1940) I suggested that Vitello wrote his book, after he had taken cognizance of Peckham's *Perspectiva*.
9. XXXVII, X.
10. De ira Dei, CX.
11. VIII, XIV.
12. PLINY.—XXXVII, XX.
13. *Encycl. Brit.*, 14th edition.
14. *The Encycl. Americana*, 1922.
15. PLINY.—(XXXVII, XX) says, that the finest sort of beryl is sea-green (qui viriditatem puri maris imitantur). In the Dutch language beryl sometimes is called "zeegroen-steen" (sea-green stone) and "zeewater-steen" (sea-water stone).
16. LAROUSSE.—*Grand Dict. Univ.*, "Quelques auteurs, le pere Monnet entre autres, dans son Dictionnaire, pretendent que le beryl n'est autre chose que le diamant".
17. Algemeen verklarend Woordenboek, 5th edition 1912.
18. "Bericle li Englois le clament." "Qui mont le prisent et mont l'aiment." *Lapidarium* of Berne. v. 487.
19. Berillistics mean fortune-telling by means of mirrors or crystal spheres. "Berillistica est ars ipsa visiones in berillis et crystallis videndi" Paracelsus.
20. MEYER-LUEBKE.—*Romanisches etym. Woerterbuch*.
21. Also: Pauly-Wissowa, *Real-Encycl.* and W. v. Wartburg, *Franz. etymol. Wtb.*
22. *Lapidaire en vers*, v. 1229 This French *Lapidaire* was a translation of a book written by Marbodius, Bishop of Rennes (between 1100 and 1125). *Vide*: L. Pannier, *Les Lapidaires français du moyen-age*, 1882. The same fact is also mentioned by Vincentius Bellovacensis (c. 1264), *Speculum quadruplex*, 1624, Lib. VIII, VII), and by the English polyhistor Bartholomaeus Anglicus, *De proprietatibus rerum*, Lib. XVI, XXI (written about 1250).
23. Baist in Kluge's *Etymol. Wtb. d. deutschen Sprache*, 6th edition, 1899. Hirschberg (*Graefe-Saemisch T. XIII*, p. 283) says, that Beryllus was the medieval name of "Krystall" or glass.
24. Litt. remiss, ann. 1449 in Reg. 179 Chartoph. reg. ch. 349; *Vide* Du Cange.
25. PAULY-WISSOWA.
26. FARBIGE.—insbesondere gruene Glaeser als Augenschutz, 1929, p. 10.
27. XXXVII, XVI.
28. The growth of civilization, p. 49-50.
29. The ancients knew that a strong light could injure the eyes. Snow-blindness is described by Xenophon; Lucretius, IV, 321, says that looking at the sun can cause blindness. On the other hand it was also thought that darkness was injurious to the eyes. So Isidorus Hispalensis (V, XXI) gives the queer etymology: "nox a nocendo dicta, eo quod oculis noceat," and Beda Venerabilis (*De natura rerum*, 1529, p. 17) says nearly the same thing. So it seems that the ancient authors who believed that colours consisted as a mixture of white and black, chose a mixture (in the form of a coloured glass) between strong light and darkness.
30. *De Gemmarum lapidumque pretiosorum formis*, etc. Coloniae, 1539, p. 28.
31. *Lapidarium* of Modena, v. 387 sqq.
32. *Lapidaire en vers*.
33. *Lapidarium* of Berne.
34. *Lapidarium* of Cambridge.