Therefore we may find a Value of z expreſt by the Powers of y; again, ſince $1 + z = \overline{1+y}^{n}$, therefore $z = \overline{1+y}^{n} - 1$ that is $z = ny + \frac{n}{1} \times \frac{n-1}{2} yy + \frac{n}{1} \times \frac{n-1}{2} \times \frac{n-2}{3} y^3$, &c. Therefore z is doubly expreſt by the Powers of y. Compare theſe Two Values together, and the Co efficients $a, b, c,$ &c. will be determin'd, except the firſt a which may be taken at Pleaſure, and gives accordingly, all the different Species of Logarithms.

XI. *An Account of the Appearance of an extraordinary* Iris *ſeen at* Cheſter, *in* Auguſt *laſt, by* E. Halley.

ON the Sixth Day of *Auguſt* laſt, in the Evening, between Six and Seven of the Clock, I went to take the Air upon the Walls of *Cheſter*, when I was ſurprized by a ſudden Shower, which forced me to take Shelter in a Nich that afforded me a Seat in the Wall, near the North Eaſt Corner thereof. As I ſat there, I obſerved an *Iris*, exceedingly vivid, as to its Colours, at firſt on the South Side only, but in a little Time with an entire Arch; and ſoon after, the Beams of the Sun being very ſtrong, there appeared a ſecondary *Iris*, whoſe Colours were more than ordinary Bright; but inverted, as uſually: that is, the Red was inwards, which in the primary *Iris* is outward, and *è contra* for the Blues. But what I took moſt Notice of was, that with theſe Two concentrick Arches, there appeared a Third Arch, near upon as bright as the Secondary *Iris*, but coloured in the Order of the Primary, which took its Riſe from the Interſection of the Horizon and Primary *Iris*, and went

croſs the Space between the Two, and interſected the Secondary, as in the Figure *AFCG*. interſects the Secondary *Iris EFGD*, dividing the Arch *ED* into Three equal Parts, as near as I could then gueſs: but at firſt the Arch *AF* did not appear, which afterwards became as bright as the former. I obſerved the Points *F* and *G* to ariſe and the Arch *FG* gradually to contract, till at length the Two Arches *FHG*, and *FG* became co-incident; when for a great Space, the Secondary *Iris* loſt its Colours, and appeared like a White Arch at the Top. I obſerved alſo, that at the Points *F* and *G*, the Interſection of the Interior Red of the ſecondary *Iris*, and the exterior Red of the Arch, was much more intenſely Red than the outward Limb of the Primary *Iris*; and that during the whole Appearance, the upper Part of the third *Iris* was not at all viſible, beyond the Interſections, *F*, *G*. This uncommon Sight entertained me for about Twenty Minutes, when the Clouds blowing away, the whole Vaniſhed. I was at firſt amazed with the Sight, but afterwards, recollecting that the Sun ſhone along the River *Dee*, which from thence empties it ſelf into the *W.N.W.* where the Sun then was, I concluded, this Secondary Arch, *AFHGC*, was produced by the Beams of the Sun reflected from that Water, which at that time was very Calm; and it had been much more Bright had it been at that time about High, as it was Low Water, when all the Sands were bare. I was ſoon confirmed that my Suppoſition was Right, and that it anſwered all the Appearance without any Scruple, and that the Arch *AFHGC*, was no other than that part of the Circle of the *Iris*, that would have been under the Earth, bent upwards by Reflection; of which no more need to be ſaid. I remember not to have read of any ſuch *Iris*, in any Author I have hitherto met with, and though *Des Cartes*, in his *Meteors*, *pag.* 225. of the

Amſterdam

Amſterdam Edition, ſpeaks of an inverted *Iris* by Reflection, I query whether ever any ſuch has been really obſerved, at leaſt it ought rather to appear a whole Circle, than a piece thereof: nor is it poſſible to be ſeen, as he deſcribes it, when the Sun is leſs than Five and Forty Degrees high; in which Caſe, the Shade of the Cloud out of which the Rain falls, would be very apt to intercept the Beams of the Sun: and till ſome authentick Relation ſhall ſhew in what Circumſtances it hath been effected, I muſt beg pardon if I ſtill doubt the Appearance of any ſuch Phenomenon.

On this Occaſion, I can't forbear relating another Appearance I ſaw in *London* Streets on the 11th of *March*, in the Year 1696. It rained pretty thick a ſmall Rain, and the Sun, about Two of the Clock, ſhone directly down *Abchurch-Lane*, as I was paſſing along it with my Back to him, when I perceived the Arch of the primary Rain-Bow in the Drops of Rain ſpanning the Street like an Arch of a Building, under which I was to paſs; the Crown whereof was not much higher than my Head, and the diameter thereof ſcarce ſo wide as the Street, which is but 5 Yards; and it moved along with me as faſt as I went; the Colours being very vivid and diſtinct, though the Arch it ſelf appeared but narrow, and the Houſes were every where behind it. This, tho' very uncommon, will not appear ſtrange to thoſe that have well conſidered the Nature of the *Iris*; but the Ancients who believed *Iris* the Meſſenger of the Gods, would have been apt to have thought ſhe had ſome peculiar Meſſage, when ſhe placed her ſelf ſo near me, as to be almoſt within reach: I underſtood her to invite me to inquire further into the Nature of her Production,

and accordingly, taking her under my Conſideration, I had all the Succeſs I could wiſh for, which perhaps may not be unacceptable to the Curious, if I publiſh in one of the next Tranſactions.

XII *Account of Books.*

1. *Voyages and Diſcoveries in* South America: *The Firſt up the River of* Amazons *to* Quito *in* Peru, *and back again to* Brazil, *performed at the Command of the King of* Spain, *by* Chriſtopher D'Acugna. *The Second, up the River of* Plate, *and thence by Land to the Mines of* Potoſi, *by M.* Acarete. *The Third, from* Cayenne *into* Guiana, *in ſearch of the Lake of* Parima, *reputed the richeſt Place in the World, by M.* Grillet, *and* Bechamel. *Done into Engliſh from the Originals, being the only Accounts of thoſe Parts hitherto extant, with Maps.* London, *Printed for* Sam. Buckly, *at the* Dolphin *in* Fleet-Street.

FAther *D'Acugna*, begins with a ſhort Account of ſome remarkable Attempts that had been made unſuccesfully at ſeveral times by the *Spaniards*, to diſcover the River of *Amazons*; and then proceds to the perfect Diſcovery of it, by *Don Pedro de Texeira*, who in the Year 1637. ſet out from *Para* in *Brazil*, with 70 Portugeſe, and 1200 Indians in 47 Canoos, and paſſing up the River with much difficulty, got to *Quito* in *Peru*:

The

Fig. 5.

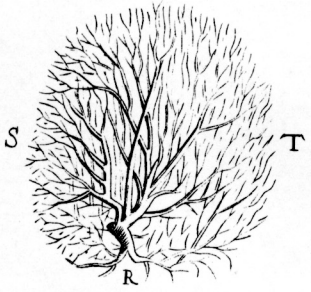

Fig. 4.

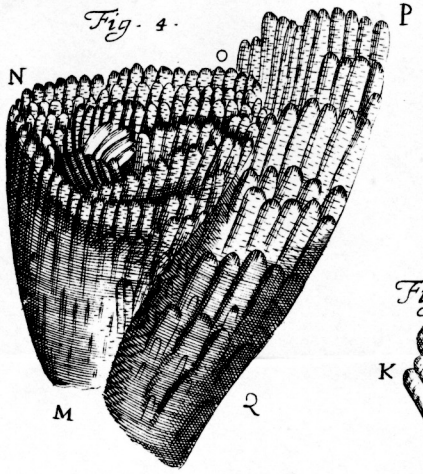

Fig. 1.

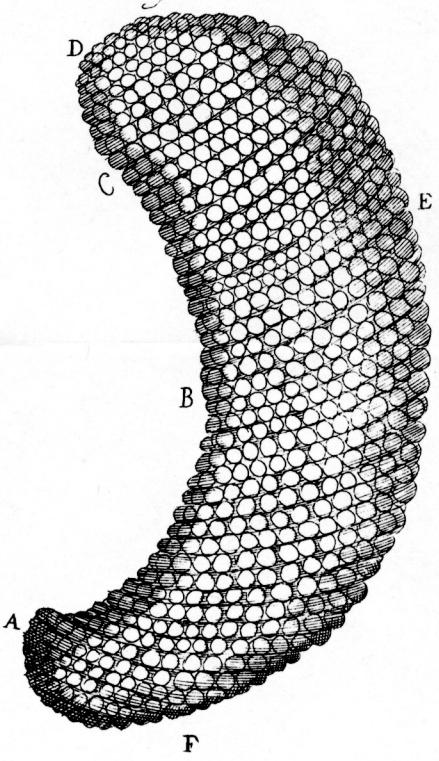

Fig. 3.

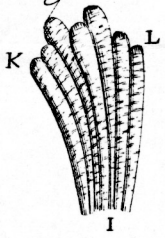

Fig. 2.

Fig. 6.

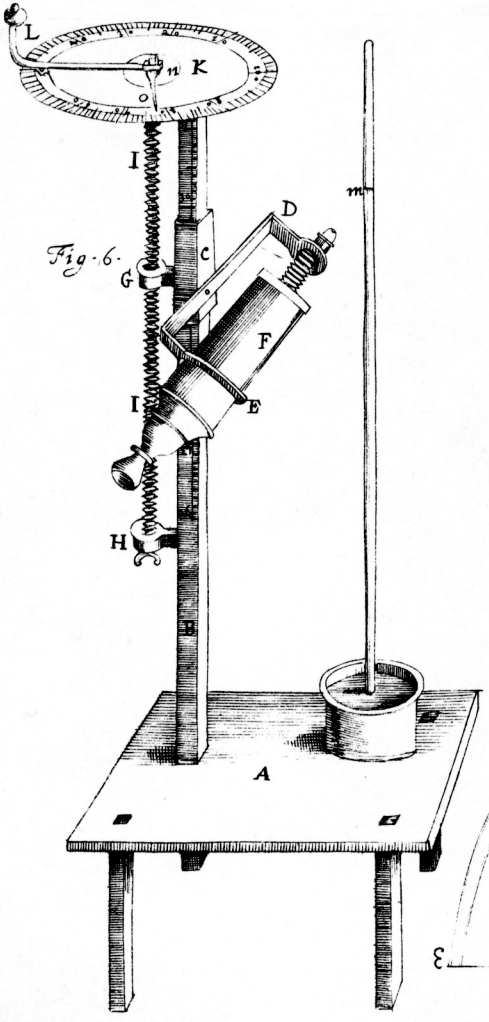

Fig. 7.