

month: upon the whole, their judgment was much contrary to the emperor's intentions, and interest of the missionaries. For the Mandarines, having reported at large the ancient edicts enacted against the christian religion, concluded, that this business required no farther discussion; and that they were to stick close to the first orders of parliaments, and of the court, which prohibited, upon grievous penalties, the natural born subjects, to entertain the new doctrine of the Europeans; that, notwithstanding they deem'd it convenient to preserve the church in the city of Hamcheu, and to give orders to the Mandarines of that province, not to confound the christian religion with the seditious sects of China.

The emperor was, in a manner, as much concerned as the missionaries at this new decree: when they presented it to him, he discovered some trouble at it, and left it for several days in his closet, without declaring himself, to the end that the Mandarines of Lipou, having notice of it, might have time to come back; but, when he saw their obstinacy, he was not willing to make turbulent spirits to rebel; and, resolved at last, tho' fore against his will, to sign it.

This news threw the fathers into a great consternation; and one Chao a gentleman of the bed-chamber, whom the emperor sent to comfort them, found them in a condition worthy of compassion. He was troubled at it himself (for he loves us dearly, and hath done us upon several occasions most signal services). This officer endeavour'd, as he had orders, to moderate their affliction; but, whether it was that their fathers were not masters of themselves, or, that they had given over all thoughts of keeping any further correspondence with a prince that had dejected them, they utter'd upon this occasion whatsoever the most sensible grief is able to inspire into afflicted persons.

What signify, my lord, say they, all the favours you hitherto pleas'd the emperor to do us, since

at this conjuncture himself makes them unprofitable. Was it to tumble us down in a more illustrious manner, that he apply'd himself so long time to exalt us? What delight will he take hereafter to see us, covered with shame and confusion, to serve for a laughing-stock to our enemies, and be a spectacle to the whole empire? Will that prince, who loved us so dearly, will he be able hereafter, without being moved at it, to hear that the rabble insult over us? That his petty officers make us to be beaten in open courts? That viceroys banish us from their provinces, that they exile us shamefully from his empire?

We lay out ourselves for him, our cares, studies, and all our watchings are given to him. One part of our brethren are already dead by their labours, others have impair'd their health by the same; and we who are still alive, enforced by the same desire of pleasing him, willingly and freely sacrifice all the precious moments of our life to him.

We hoped to merit by this zeal, that he would at length approve of the religion, which we preach to his people (for why should we dissemble the matter to you, to you who have so long known the real sentiments of our hearts) that was, you know, the only motive of all our undertakings: how powerful, how magnificent soever this prince may be, we should never have had the least thoughts of coming so far to serve him, if the interest of our most holy faith had not engaged us therein. Nevertheless he proscribes it at this day, and signs with his own hand the shameful decree of our condemnation. There you see, my lord, what all our hopes are come to. There is the fruit of all our labours: With how much greater calmness would we have received the sentence of death, than an edict of this nature? For, do not imagine, that we are able to survive the loss of christianity.

This discourse, attended with a great deal of trouble, and a torrent of tears, made a great impression

upon the officer's spirit; he went immediately to report it to the emperor, and described to him the father's sorrow in such lively colours, that this good prince gave way to some emotion. *I have always, said, sought out all occasions, to do them a kindness, but the Chinese have traversed all my good designs, I could at this time forbear following the stream; but, in short, however the case stands, they may make account that I love them, and that I shall not forsake them.*

In effect, he began more than ever to employ them in his service; but yet, he no longer found the same eagerness in the execution of his orders, nor the same serenity and alacrity upon their countenances. They always appeared before him dejected, mournful, and as if their heads had been out of order by the shrewd blow they lately receiv'd. However, he was so far from being disheartened, that he proposed to them, to send for a doctor of physick to court, who was newly arrived at Macao, who, that he might be the more serviceable to the missions, had turned priest of our company.

The fathers made answer, that this doctor had wish'd, and that too with a great deal of passion, to employ his skill, and all the arcana of his art, to preserve such a precious health, as that of his majesty; but, being amazed at the decree that had pass'd against the christians, he was quite off from any design to come into China; and that he was preparing to return into Europe: that, nevertheless, since his majesty ordered it should be so, they would set forth with all expedition to Mocao to have him come.

When the missionaries were over head and ears in their anxiety, the viceroy of Hamcheu triumphed at first success, and cast about how to take new measures to finish his work. He set all the commissi-
of the officers at work, for several days, to put copies of the new decree, to have them sent throughout all the provinces; at last, he put out more severe orders against the christians

than the former. In fine, no longer doubting of the victory, he sent to the emperor an ample request against the missionaries, to accomplish their undoing; but this request came a little too late: and, when it was presented, the face of affairs was already alter'd.

For prince Sofan, not being able to withstand the solicitations of the fathers, and especially of father Gerbillon, whose particular friend he was, resolved to solicit afresh on our behalf; wherefore he went and found the emperor, and represented to him whatsoever the most zealous christian could possibly have spoken on the like occasion.

He set before him, again, the zeal and devotion of the fathers in whatsoever respected his person, the the services they had render'd the state during the wars, their being intent to perfect the sciences, and to rectify the kalendar. *In a word, sir, said he, they are a sort of people, that make no account of their lives, when serving or pleasing you is in question. 'Tis true, all this could not deserve, that your majesty should approve of their faith, if it be otherwise dangerous; but, was there ever a more wholesome doctrine than theirs, or more beneficial to the government of a people?*

The emperor, who joyfully heard this discourse, yet for all that persisted in his former determination, *It is done now, said he to him, I should have done myself a kindness, to have favoured these honest missionaries; but the outrageous carriage of the Mandarines against them did not permit me to follow my own inclination.*

How, sir, replied the prince, are not you the master? And when the business was to do justice to your subjects, so eminent as these are, could not you interpose your authority? I will go myself, if your majesty thinks fit, to these gentlemen, and I am not without hopes of bringing them to terms. At last the emperor, not being any longer able to hold it out against so pressing solicitations, causes a letter immediately to be dispatched to the Colsas, their assessors, and to all the

the Tartarian Mandarines of Lipou; and this is the purport of the letter.

The thirty first year of the reign of Cham-bi, the second day of the second month of the moon. Yi-samba, minister of state, declares to you the will and pleasure of the emperor in these terms.

The Europeans in my court have for a long time been directors of the mathematicks. During the civil wars they have rendered me most effectual service, by means of some cannon that they got cast: their prudence and singular address, accompanied with much zeal and indefatigable toil, obliges me once more to consider them. And, besides that, their law is not seditious, and does not induce people to revolt; so that it seems good to us, to permit it, to the end that all those, who are willing to embrace it, may freely go into the churches, and make publick profession of the worship there performed to the supreme Lord of Heaven.

Our will and pleasure therefore is, that all, and several the edicts that hitherto have been published against it, by, and with the advice and counsel of our tribunals, be at present torn and burnt. You ministers of state, and you Tartarian Mandarines of the sovereign court of rites, assemble together, examine the matter, and give me your advice upon the whole with all speed.

Prince Sofan himself was present at this assembly, according as he and the emperor had agreed; and albeit he was no christian, yet did he speak after such a pathetical and taking manner in favour of us, that he seemed rather to defend his own, or the states ease, than the concerns of a foreign religion; these are his own words, without adding one syllable, as they are found in the original, which I faithfully translate.

You know, gentlemen, with what application, what zeal, and loyalty these Europeans busy themselves in the service of his majesty. The greatest number amongst us, tho' concerned to preserve and maintain our conquests, have rather devoted them-

‘ selves to glory, riches, and making their own
 ‘ fortunes, than to the settling the state upon a sound
 ‘ bottom; very few of them do purely aim at the
 ‘ publick good. These strangers, on the other hand,
 ‘ exempt from all passion, love the empire more than
 ‘ we do ourselves, and do frankly sacrifice their own
 ‘ repose to the tranquillity of our provinces.

‘ We have experienc’d the same during the whole
 ‘ course of our civilwars, and in the late bicker-
 ‘ ings we had with the Muscovite; for, to whom
 ‘ do you suppose us obliged for the happy success of
 ‘ this negotiation? It would without all question be
 ‘ consistent with my interest, to ascribe all the glory
 ‘ of it to myself, who have been the plenipoten-
 ‘ tiary for the peace; but, if I were so unjust as to
 ‘ do myself that honour, to the prejudice of these
 ‘ fathers, the chieftains of the enemies troops, all
 ‘ my own officers, and my own army would say I
 ‘ told an untruth.

‘ It is, gentlemen, these fathers, who by their
 ‘ prudence, and insight into affairs, and the just tem-
 ‘ per and moderation that they brought, put an end
 ‘ to that important affair. Without their counsel,
 ‘ we should have been forced to exact, at the expence
 ‘ of our blood, the rights which the injustice of our
 ‘ enemies did so obstinately refuse to the emperor; or,
 ‘ perhaps, you would have had the trouble to see us
 ‘ wholly divested of them; or, at least I should
 ‘ have been no longer in a condition to defend them.

‘ What have we done, gentlemen, in return for
 ‘ such eminent service? Nay, what can we do for a
 ‘ company of men, who demand neither riches, nor
 ‘ places of trust, nor honours? Who esteem and
 ‘ respect us, without so much as caring whether we
 ‘ do so by them! Certainly we ought to be concerned,
 ‘ if it were not in our power some way or other to
 ‘ oblige strangers, who do so generously sacrifice
 ‘ themselves for us; and I am inclin’d to believe,
 ‘ gentlemen, that, when you have made reflection

‘ thereon

thereon, you will give me thanks for having discovered to you the only way whereby they can become sensible of our acknowledgment.

They have a law, which is to them instead of all the riches in the world. They adore a Deity, who alone makes up all their comfort and happiness. Suffer them only freely to enjoy the benefit they possess, and permit them to communicate it to our people; altho' in that very thing they rather do us a kindness, than we do them; yet they will be grateful to us, and accept it from our hands, as the recompence of all their services.

The Lamas of Tartary, and the Bonzes of China, are not troubled in the exercise of their religion. Nay, the very Mahometans have rear'd a mosque at Hamcheu, that domineers over all our publick edifices. They oppose no banks to these torrents, that threaten inundation to all China: men connive, they approve of in some measure all these unprofitable and dangerous sects; and, now when the Europeans sue to us for liberty to preach up a doctrine, that contains no other than maxims of the most refined virtue, we do not only repulse them with disdain, but think we do good service to condemn them: just as if the laws, that oblige us to shut up the entrance into our empire against superstition, and lying vanities, had likewise proscribed naked truth.

The prince, expatiating much upon this point, was interrupted by the heads of the assembly, who remonstrated to him, that, say what he could, there was still some danger left this new sect might occasion disorder in process of time. And, that it was the part of good policy to stifle these little monsters of rebellion and discord, in their very birth. That, in short, they were foreigners, whose spirit and secret designs were capable of administering some suspicion.

What suspicion, reply'd the prince? I have been so for this ten years, and I never heard any complaint against the christians. Believe me, gentle-

men, it were to be wish'd, that the whole empire would embrace their religion. For, is it not that religion that commands children to honour and obey their parents? Subjects to be faithful to their superiors, servants exactly to perform the will of their masters: That forbids to kill, to steal, and to cozen; not to covet any thing that is your neighbours. That abhors perjury and calumny. That dislikes lying and falshood. That inspires modesty, simplicity, uprightness and temperance. Examine, gentlemen, and sound, if possible, the heart of man; if there you find one single vice which the christian law does not forbid, or one virtue that it does not enjoin, and counsel; I leave you to your liberty to declare against it. But now, if all things in it be holy and consonant to reason, why do you still boggle to approve of it?

After that, the prince, seeing their minds to be wavering, propos'd the ten commandments of our religion, and explained them with so much eloquence, that the Mandarines looking one upon another, finding nothing to offer against it, did ingenuously confess that one might conform to this new doctrine without any danger. The emperor, informed of what was debated, was pleas'd (for to render the action more famous) to have also all the ministers of state to be convoked together, with the Mandarines of Lipou, who were Chinese, to whom they made known before-hand the resolution of the Tartarian Mandarines.

In this general assembly, they repeated all that was spoken in the private assembly; and, after prince Sofan had left no stone unturned to recover the Chinese from their old prejudice, they came at length to this result, that a law should be enacted favourable to the christians, which was drawn up in form of a petition, to be presented to the emperor, to obtain his confirmation of it; it was to this effect.

Hecapatai, subject to your majesty, president of the Sovereign tribunal of rites, and chief of sever

and presents to you this most humble petition, with all the submission and respect, which he and all his assessors ought to have for all your commands, especially when you do us the honour to require our advice about the important affairs of state.

We have seriously examin'd what any way relates to the Europeans, who attracted from the extremities of the world by the fame of your singular prudence, and other your eminent qualities, have past that vast extent of seas, which separates us from Europe. Since they have lived amongst us, they have merited our esteem and acknowledgement, by the signal services they have rendered us in the civil and foreign wars; by their continual application to composing of books very curious and profitable; for their uprightness and sincere affection for the commonwealth.

Besides which, these same Europeans are very peaceable, they do not excite any commotions, or foment differences in these our provinces; they do wrong to no man, they commit no notorious facts; moreover, their doctrine hath no affinity with the false and dangerous sects that infest the empire; neither do their maxims incline turbulent spirits to sedition.

Since therefore we do neither hinder the Lamas of Tartary, nor Bonzes of China from having temples, nor from offering incense therein to their pagods; much less can we, with any reason, restrain the Europeans, (who neither act nor teach any thing contrary to the wholesome laws) from having likewise their respective churches, there to preach their religion in publick. Certainly these two things would be point blank contrary to each other, and we should manifestly seem to contradict ourselves.

We therefore judge it meet and expedient, that all the temples dedicated to the Lord of heaven, in what place soever they may be, ought to be preserved; and that he will safely permit all those who would honour him, to enter into his temples, to offer incense to him, and pay that worship to him, that hath hitherto been

been practised by the christians, according to their ancient custom; so that none may, for the time to come, presume to oppose the same.

In the meantime we shall expect your majesty's orders thereupon, to the end we may communicate them to the governors and viceroys, as well at Peking, as at other cities of the provinces. Done in the thirty-first year of the reign of Cham-bi, the third day of the second month of the moon. Signed, the president of the sovereign tribunal of rites, with his assessors; and underneath the four ministers of state, called Colao, with their general officers and Mandarinés of the first order.

The emperor received this decree with unexpressible joy; he ratify'd it forthwith, and dispatch'd a copy of it to the fathers, sealed with the seal of the empire, to be, says he, perpetually preserved in the archives of their house. Some time after, he caus'd it to be published throughout the whole empire; and the supreme tribunal of rites, sending it to the principal officers, added these ensuing words. *Wherefore, you viceroys of provinces, be sure you receive this imperial edict with a most profound respect; and, as soon as it comes to your hands, read it attentively; value it; and see you fail not to execute it punctually, conformable to the example that we have given you ourselves. Moreover, cause copies of it to be taken, to be inserted into all the places of our government, and acquaint us of what you shall do in this point.*

So soon as father Intorcetta had notice of what had past at Peking, he departed for court, and went to throw himself at the emperor's feet, to render him most humble thanks in his own, and in the name of all the missionaries of China. This good grace, when he had bestowed on him many demonstrations of affection, caus'd him to be conducted back again into his province, by father Thomas, Mandariné of the mathematicks. He made his entrance into this city of Hamcheu in triumph, surrounded by a

tians: and, received by their acclamations, who look'd upon him as an angel of peace.

Nevertheless, as God mixes always some bitterness with our comforts, the joy, this good father had conceived, was soon overcast, and allay'd by the utter ruin of his church, involved some time before in a publick conflagration, wherewith the best part of the city was consumed.

This accident gave occasion to father Thomas, to desire the viceroy to build a new church for the father; and he himself gave him to understand, that the emperor expected it from him. This Mandarin was intolerably vexed at the ill success of his enterprise, which the late arrival of the father increased; but he was quite besides himself, to think he must be forced to lodge a stranger honourably in his capital city, whom he would, with all his heart, have banish'd some days before from his province; yet he dissembled the matter like a wise man; and, to comply with the time, he afforded the missionary one of the finest houses in the city, till such time as, at his own charges, he should have rebuilt the ancient college.

It was not at Hamcheu alone, that the christian religion seem'd to triumph; all the churches of the empire, which the new edict, in some respect, drew out of captivity, by granting to the people liberty of conscience, gave great demonstrations of joy; but the city of Macao, that served for a cradle to the infant christianity, made its joy to appear by a solemn festival, which was accompanied with all the tokens of mirth and chearfulness, which the people's devotion rendered much more solemn.

Those, who shall consider the constitution of the government of China, the almost unfurmountable difficulties that strangers have met with in screwing themselves into it; the aversion of mens minds from novelty in matters of religion; and, on the other hand, the small company of missionaries Europe hath

supply'd us with, the civilwars, and revolutions, that have so often discomposed the state in this latter age, will seriously confess, that this occurrence, one of the most memorable, that probably hath happened since the infancy of the church, cannot be the product of human wisdom. * *Deus Autem rex noster ante secula operatus est salutem in medio terræ tu confirmasti in virtute tua mare—tu confregisti capita draconis; tuus est dies & tua est nox.* It is our God, 'tis our everlasting king, who hath wrought salvation in this vast kingdom, which they call the middle of the earth. He it is, who hath for ever brought a calm upon this sea, so much agitated, and infamous hitherto for so many shipwracks. Thou hast, O Lord, bruised the head of that proud dragon whose name was so dreadful. It is now then that the day and the night, that is to say, the East and the West belong to thee; forasmuch as both worlds have at last submitted to thy empire.

At such time as I had the honour to present to the most holy father, that idolatry in the East attacked on all sides by the ministers of the gospel, was just upon the point of falling; and that, if once China could be drawn in to declare itself in favour of us, all the people adjacent, led by their example, would quickly break their idols in pieces, and would not be long before they submitted to the yoke of the christian faith; this thought alone transported this holy pontiff with joy, and revived that sincere piety, and fervent zeal in his heart, that he shews upon all occasions for the salvation of souls; but he told me that such a great change as that was no ordinary miracle.

What sentiments will he have, my lord, when he understands that what (as things then stood) he scarce durst hope for are now at last accomplish'd for the glory of his pontificate, and universal benefit of Christendom. We know, moreover, that, since this

* Plat. 73.
is adored in China.

† The dragon is the emperor's arms, and

amous edict, the Chinese run in crowds to be baptised: That the Mandarin, still idolaters, build churches to the only true God: That a prince of the blood hath abjured his errors, and embraced the faith and cross of Jesus Christ: That the emperor himself causeth a church to be erected in his palace, and lodges the ministers of the gospel near his own person.

These happy preparations will, without all question, oblige the holy father to employ all his cares to the intire compleating of so great a work; to that effect we demand of him pastors formed by his own hand, and replenished with his spirit: missionaries altogether unbyassed, learned, self-denying, that join prudence with evangelical simplicity; who may seek the glory of Christ, and that of the nation, rather than their own.

Last of all, we heartily wish that all christian kingdoms, out of emulation one of another, may strive (under the pope's authority) who shall still send most ministers into these vast countries, to share with us in our labours, and extend our conquests. Yea, tho' the most populous universities and most famous seminaries should be transplanted thither, it would yet be but few. Yea, and with all these assistances, we should notwithstanding, to speak in figurative language, groan under the burthen and heat of the day. What would become of us, if we leave this new born world to a small number of labourers, whom the piety of some do there maintain?

It is to beg this favour, that I assume the boldness, my lord, to intrust you, at this time, with the conducting the missions. I am well assured that you never undertook any business of consequence for the good of Christendom, but you accomplish'd it. Now, altho' this that I propose to you were ten times more difficult than it is indeed, I am, in a manner, sure of success, as soon as ever you shall please take it upon you.

Yet

Yet notwithstanding, my lord, to succeed happily in this business, it is not necessary to exert, and put in practice all those qualities of mind, that make you almost ever superior to great enterprizes. That consummate wisdom, that conducts you thro' the most sure roads. That continual intention of mind, which the hardest labour cannot interrupt. That dexterous insinuating conduct, so impenetrable to the quickest eye. In a word, that art, so peculiar to you of persuading, and obtaining what you please. All this is not requisite to the business in hand, you need do no more here but abandon yourself to your own zeal, and use that lively and natural eloquence, that animates your discourses, every time you are pleased, in the sacred college, to stand up for the interest of religion, or when you represent to Christ's vicar the urgent necessities of the church.

Your care, your piety, my lord, will be seconded with as many apostles, as you shall procure missionaries for us: then will the idolaters, newly converted, and believers establish'd and settled in faith, be equally sensible of the great benefits that you shall procure them, and the people, enlightened by these divine lights, which the holy see shall disperse as far as the extremity of the earth, will, all their lives long, bless the paternal charity of the vicar of Christ, and ardent zeal of his ministers. I am, in the most profound respect,

My Lord,

*Your Eminence's most humble,
and most obedient Servant.*

L. J.

L E T T E R X I V .

To Monsieur the Abbot Bignon.

A General Idea of the Observations we have made in the Indies, and in China.

Sir,

Altho' you should not be at the head of the most ingenious and learned men in Europe, by the rank you hold in the Academy Royal; yet the passion I have always had to give you some marks of my esteem, and to improve by your knowledge, would engage me to communicate to you what we have performed in the Indies, as to the perfection of sciences.

It is, sir, for the credit of this illustrious academy (with which we have such a strict friendship and correspondence) that a person of your merit should seem to have any esteem for the persons it employs in its function; and I suppose, the protection, you are pleased to afford us in the world, will be taken kindly by them; but it is yet more our particular interest, that you would severely and strictly examine our works, and that, when you have implored the esteem of the publick on our behalf, you would, by an impartial and learned criticizing, take some pains to perfect us, and make us one day worthy of its approbation, and your own.

It is not, sir, that I have a mind, in this place, to expose to you in particular all that we have permitted to acquire a more exact knowledge for the character of the motion of the stars, or to deliver memoirs to those who design to penetrate farther into the secret mysteries of nature. This work, which is of too large an extent, to be compressed within the compass of a single letter, will serve for the subject

of an intire volume, which we hope shortly to have the honour to present to you.

My design at present is only to give you a general idea of it, to the end, that, understanding before-hand the road we have hitherto kept, you may the better judge what is needful to be added, to make us exact, or to be altered, as to our method.

When we departed from Paris, with the instructions of the king, of his ministers of state, and of the academy royal, we proposed to ourselves nothing less than the perfection of natural sciences; but, this project containing in it a great diversity of matters, we supposed it convenient for every one to take his part, not only because each of us had not leisure enough to ply so many different studies all at once, but also, because the spirit of a man hath its limits, and it is very rare to find, in one and the same person, a genius equally proper for all things.

So that we agreed, that some of us should addict ourselves to astronomical observations, geometry, and to the examination of mechanical arts, whilst others should chiefly be taken up in the study of what relates to anatomy, knowledge of simples, history of animals, and other parts of natural philosophy, which every one should chuse, according as his fancy led him; yet so, that even those, who should keep themselves within the compass of any subject matter, should, nevertheless, not neglect the rest when time, place, or persons should afford them occasions to make any new discovery therein: we agreed likewise, that we should mutually communicate our notions one to another, to the end, that each one might benefit by the common reflections, and withal, that nothing, if possible, should divert our attention.

But let us take what care we could to succeed in this undertaking, we easily perceived, that six persons busied besides in the study of languages, and in preaching

the gospel, could never be able to go through with such a vast design; it therefore came into our mind, first of all, to engage the Europeans that were at that time in the Indies, but above all, the missionaries; to the end, that every one of us might concur in carrying on a design, equally beneficial and glorious to all nations. Secondly, to establish, in divers places, some particular houses, where our mathematicians and philosophers should labour after the example, and under the conduct of the academicians of Paris; who from thence, as from the center of sciences, might communicate their thoughts, their method, and their discoveries, and receive (I may be so bold as to say so) as by reflection, our weak lights.

But these two expedients, so proper in themselves for the promoting of our project, and withal capable to render France famous to posterity, have hitherto proved ineffectual; on the one hand, we have found very little disposition in other nations to second us; on the other hand, the revolutions of Siam have overthrow our first observatory, which the king's liberality, and the zeal of the ministers of state, had in a manner quite finished.

These accidents, tho' fatal ones, did not yet discourage us; we had thoughts of laying the foundation of a second observatory in China, still more magnificent than that of Siam. It would have been no such difficult matter to have built several others afterwards at Hispahan in Persia, at Agria in the Mogul's country, in the isle of Corneo under the line, Timor, and in several other places, whose situation might facilitate the execution of our design; when that universal war, that has set all Europe on fire so many years, made us sensible of it in the Indies, and in one moment broke all our measures.

Perhaps, sir, peace may put us into the same road again, that the tempest hath forced us to forsake,

and that, all in good time, we shall enjoy a calm equally advantageous to religion, to the people's happiness, and to the perfection of sciences. In the mean time, as contrary winds do not hinder skilful pilots to go forward a little, notwithstanding they do much retard their sailing; so have we endeavoured, maugre all these tempests, to pursue our former design, and continue a work, the essay of which, as you may shortly see, will not perhaps be altogether unprofitable.

The difficulty that men have found from all antiquity, to regulate the motions of the stars, was never to be overcome; either by the lucubrations of ancient astronomers, or even by all the penetration of the neoterics; what endeavours soever our imagination may have used to dive into these mysteries of the omnipotent Creator, yet have we made but a sorry progress; and we must needs confess, that heaven is at a much greater distance from our thoughts and conceptions, than it is elevated above our heads. Nothing can bring us nearer to it, than a continued series of observations, and an exact inquiry into every thing that occurs in the stars, because that this continual attention to their motions (making us perceive the gross, and as it were palpable errors of ancient systems) gives occasion to astronomers to reform them by little and little, and make them more conformable to observation; to this purpose in these latter days, men have so carefully applied themselves to the perfecting of instruments, pendulums, telescopes, and of whatsoever may anyway bring the heavens nearer to our eyes.

In France, England, and Denmark, and in divers other places in the world, they have erected huge machines, built magnificent towers, as it were, to serve instead of stairs to those who would proceed in this new road, and the progress, that many observers have already made, is so considerable, that

one may hope for great matters in future ages ; provided princes do continue, by their liberality, to uphold such a toilsome piece of work. This is, fir, in general, what we have contributed towards it for our part.

First of all, we have been most conversant in observing the eclipses ; and because those of the sun here, more than all others, occasioned people's admiration, we have been very diligent to improve all occasions that might seem favourable to us. Amongst those that offered themselves, there chanced to be two somewhat odd and particular, and will afford some light to the curious.

The first was the eclipse that happen'd about the end of April 1688 ; we knew* that it was to be total in some parts of China, altho' at Pekin, where we sojourned some time before, it was to be but indifferent great ; for you know, fir, there is a great difference between the eclipses of the sun and those of the moon : the moon, that hath only a precarious light, is cover'd with real darkness, whenever the earth robs her of the sun-beams, and doth not appear eclipsed to some certain people, but that she at the same time hides her face from the eyes of others in like manner. The sun, on the contrary, that is a body, of its own nature, always splendid, always luminous, or, rather, is light itself, can never be obfuscated or darkened ; and when the moon, by covering it, seems to deprive it of its lustre, it is not the sun that is eclipsed, it is the earth ; it is we indeed that do find ourselves at that time all in darkness ; so that astronomers would speak more properly, if, instead of naming an eclipse of the sun, they would name it an eclipse of the earth.

Thence it comes to pass, that this eclipse is at the same time very different, according to the different places where one is ; insomuch that if several observers, at a distance one from another, were placed

upon the same line drawn from east to west, it might so happen, that the first would see the whole body of the sun, as it is commonly seen, whilst the second would discover but one part of it. There it would appear half covered, here it would be no more than an ark of light; and still, farther off, it might perchance totally disappear.

It is likewise for the same reason, that an observer, placed at the center of the earth, would not behold the sun eclipsed, as we do here; now the difference, which they term the Parallax, would increase, or decrease, according as this luminary should be more or less elevated above the horizon. This is what the Chinese were hitherto ignorant of, and of which, to this day, they have but a very superficial knowledge. As for the Indians, much less capable of being polish'd and refin'd than the Chinese, they are always admiring such wonderful effects; inso-much that the king of Siam demanded one day, if the sun in Europe was the same with theirs in the Indies, since it appeared at the same time so different in these two places.

Wherefore we departed on purpose from Peking, to get to Hamcheu, a considerable city in the province of Chanfi; where, according to our calculation, the sun was to be totally eclipsed: yet, it was not so, because the longitude of the country was not yet perfectly known to us. The heavens were that day extremely serene, the place very convenient, our instruments nicely placed, and, being three observers, nothing was wanting that might render the observation exact.

Amongst the different methods that may be made use of for these sorts of operations, we made choice of two, that seem'd to us the most plain and easy; the one was to look upon the sun, with a telescope of three feet long, in which they had placed a *Focus objectivus*, a Reticula or little net, composed of twelve

twelve little threads of raw silk, very small, and equally distant one from another, yet so, that they might precisely take up all the space of the sun, whose diameter appeared after this manner to the eye, divided into twelve equal parts.

The second consisting in receiving the representation of the sun (by a telescope of twelve feet) that was painted upon a piece of pasteboard, opposite to the optick glass, at a proportionable distance; we had drawn upon the said pasteboard twelve little concentric circles, the biggest whereof was equal to the apparent discus of the sun; so that it was easy for us to determine, not only the beginning, duration, and end of the eclipse, which require no more but a single optick glass, and a well regulated pendulum; but also its bigness, or (as they commonly call it) its quantity, and the time that the shadow, or rather the moon, spends in covering, or uncovering each part of the sun: for notwithstanding all these parts are equal amongst themselves, yet it doth not therefore follow, that there is requisite an equal number of minutes to go over them, because the continual change of the Parallax retards or puts forward the apparent motion of the moon.

There wanted but the twenty-fourth part to the total covering of the sun, and we determined it to be an eclipse of eight digits and an half (for so astronomers term it) for, to make their calculation just, they are wont to divide the apparent diameter of the planets into twelve digits, and every digit into sixty minutes. In the mean time we observed first of all, that, when three quarters of the sun were eclipsed, the day appeared in a manner not at all changed by it; nay, and we could hardly have perceiv'd it, if we had not had otherwise notice of it; so that an ordinary cloud was almost capable of producing the very same effect.

Secondly, tho' we did not, at the height of the eclipse, see more than a little ark of light, yet might a man read very easily, in the court, the smallest character; I have seen some storms that obscured the heavens as much as they were at that time.

Thirdly, we could by no means discover any star, tho' we endeavour'd it all we could; we only perceived Venus, which doth not denote any great obscurity, since this planet appears oftentimes, even at such time as the sun is wholly risen above the horizon.

The Chinese, notwithstanding, were terribly alarmed, imagining that the earth was going suddenly to be enveloped in thick darkness. They made an hideous noise all abroad, to oblige the dragon to go on. It is to this animal that they attribute all the disappearances of the stars, which come to pass, say they, because the celestial dragon, being hunger'd, holds at that time the sun or moon fast between his teeth, with a design to devour them.

At length the light returned by degrees, and eased the Chinese of their trouble; but we continued our operation, comparing by different calculations the greatness, continuance, and ending of this eclipse, with the different tables of ancient and modern astronomers. There were also made at Pekin, Ham-chen, and in several other cities of China, the very same observations, which might have served to determine the longitude of all these different places, if we had not had more sure and easier methods to know it by.

Upon the whole, this observation afforded an occasion to make some reflections upon several other eclipses, whereof authors speak diversly. Herodotus lib. 1. relates, that, upon the very day that the king of the Medes and the king of the Lydians fought a bloody battle, the sun appeared totally eclipsed. The combate, saith he, lasted a long time, in equal advantage on both sides, till, all on a sudden, thick darkness

channels, covered the earth, and for a while suspended the fury of the soldiers. Father Petau hath placed this eclipse in the year 597, before the birth of our Saviour, on the 9th of July, altho' according to his calculation, it ought to be but of 9 digits 22 minutes; imagining, without doubt, that this portion of the sun eclipsed was considerable enough to verify such thick darkness which the historians mention: nevertheless, that is so far from sufficing, that our last observation ought to convince us, that such an indifferent eclipse, as that was, could not so much as be seen by the combatants; so that it is much more probable, that this famous battle was fought in the year 586, on the 28th day of May, a day whereon there chanced to be a total eclipse of the sun.

But Father Petau cannot disagree with us about this last eclipse, but, if we reckon it according to his tables, we shall find that it is but of 11 digits 20 minutes, that is to say, not quite so big as ours; and, for that reason, we may suppose his tables to be defective. Because the 24th part of the sun sufficeth (as we have observed) to make the day pretty clear; notwithstanding, the history would make us believe that it was obscure, yea, and even resembling the darkest night.

In the year 310, before the birth of our Saviour, Agathocles king of Sicily, sailing into Africa with his fleet, bound for Carthage, the sun totally disappeared, and the stars were seen every where, as if it had been mid-night; whereupon, divers astronomers, and particularly Ricciolus, are of opinion, that the tables that allow in this eclipse greatness, that comes pretty near that of the total, do sufficiently make out the history: nevertheless, it is manifest by what we have observed, that the stars would never have been perceived, especially in that brightness, and in that manner that Diodorus and Justin say occurred, if so be there had been any sensible part of the

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the sun discovered, except this same part, not being eclipsed, had not been near the horizon, as it happened in the year 237, in the beginning of the reign of Gordianus junior; for at that time, the heavens were so darkened, that it was impossible to know one another without wax-tapers, at least if we give credit to Julius Capitolinus.

The second eclipse we observed, still more considerable than the former, was seen by father Tachard, in his voyage into the Indies, he was at sea on board an Holland vessel; and, if the place would have given him leave to make use of instruments, we should never have seen any thing more ingenious on this subject.

The eclipse appeared central, that is to say, the center of the moon, was quite opposite to the center of the sun; but, because the apparent discus of the sun, was at that time bigger than that of the moon, there was seen in the heavens a bright ring, or a great circle of light, and what is most to be wondered at on this occasion is, that father Tachard assures us, that this circle was at least a finger's breadth, which would not agree, neither with the tables of ancient astronomers, nor of the moderns: but it is no such easy matter, to make a just estimate of the bigness of luminous bodies, when one judges only upon view; because the light that sparkles, and reflects, causeth them evermore to appear much bigger than they really are.

However, these sorts of eclipses, which are called Annular Eclipses, are very rare; yea, and some mathematicians are of opinion, that there cannot be any at all, because they suppose as a thing granted by all hands, that the diameter of the moon ~~is~~ in its apogæum, that is, at its greatest distance from the earth, was always either equal to that of the sun, or even sensibly greater.

So likewise Kepler, writing to Clavius upon the account of an annulary eclipse that they had observed at Rome on the 9th of April, in the year 1567, pretends, that this luminary border was nothing else but a little crown of condensed air, enflamed or enlightened by the sun-beams, broken or refracted in the atmosphere of the moon. This last observation may be capable of undeceiving those who may have persisted obstinately to follow the like opinion, as well as to disabuse Gassendus's disciples, who imagine that the sun cannot overflow the moon above four minutes at most, that is to say, by its 180th part.

Besides these two eclipses, we have also seen some others of lesser consequence, which I shall forbear to mention, because they contain nothing extraordinary. Those of the moon have most employ'd our time, not only because they are in a greater number, but because there is greater difficulty to observe them well.

The brighter the sun is, the more sensible is its defect, and the body of the moon, very obscure and opaque of itself, depriving us of the sight of it, doth not permit us to doubt so much as one moment of the beginning or ending of its eclipse; but it is not so with the moon, that does not lose its light but by degrees, and by an almost insensible diminution. As the experience we have of it makes us better perceive all these difficulties, than the most profound speculations; will you please, sir, to let me acquaint you, in few words, what perplexes us most, as to this point.

The earth, in its different aspects it bears to the sun, hath always one half of its globe enlightened; whilst its other hemisphere must needs be in darkness, like a bowl that is enlightened by a wax-candle by night; so that on one side there is a projection, as it were a long tail of shadow, in fashion of a cone, the

the point whereof is very far extended, and loseth itself at length in the vast extent of air.

When therefore the moon, by its particular motion, passes thro' this tenèbrous space, she loseth her light, and becomes obscure herself; but now, if we could mark the very moment wherein she enters into it and comes out again, we should know exactly the beginning and ending of the eclipse, but several accidents, that happen at that time, do not suffer us to observe it with so great niceness.

First of all, a long time before the moon touches the shadow I but just now mentioned, its oriental border is enlightened only by a small portion of the sun, which the earth deprives her of by little and little, and by piece-meal; so that, at that time, there is to be seen a kind of smoke that spreads abroad insensibly upon the body of the moon, which often precedes the real shadow a quarter of an hour; and, being this smoke always increases according as the eclipse approaches, it is so confounded and mixed with the beginning of the shadow, that it is almost impossible to distinguish it from it; so that neither experience nor application, nor yet the best telescopes, can hinder an able observator from mistaking sometimes one minute, nay, and sometimes two.

Secondly, when I say, that the eclipse is caused by the interposition of the terrestrial globe, it is not that the moon is then plunged into its shadow, which never reaches farther than 50,000 leagues, supposing the earth's diameter to be 8146 sea leagues, whereas the moon, even in her perigæum, is above 7,000 leagues from the earth; but the globe of the earth being encompassed with a thick and gross air, which we call its Atmosphere, which the rays cannot quite penetrate, there is caused by the interposition of these vapours a new shadow, whose diameter and length do far surpass the true shadow of the earth. Now these vapours are so much the more transparent, as they

they are the more remote from us ; whence it comes to pass, that they also make a more faint shadow at the beginning and end of the eclipse, and consequently, they do not afford that liberty to observers, to determine them with any exactness.

You may understand by that, sir, why we often discover the moon, yea, at the very height of the eclipse, so far as to distinguish her smallest spots ; why she paints herself at that time in so various colours, for she appears red, ash-coloured, iron-grey, bluish, or somewhat inclining to yellow, insomuch that she seems to be herself sensible of her failings, and shews certain signs of her different passions. You see on the contrary, why in some certain eclipses she totally disappears, and steals quite out of our sight. All this does, no question, happen from the nature of this atmosphere, which changes perpetually, and thereby produces these different effects.

In the third place, when the moon begins to grow dark near the horizon, it is yet more difficult to observe well the beginning of it ; and a man must take special notice, that the time of this apparent beginning, compared with the time of its ending, doth not give him the middle of the eclipse exactly, because the vapours are much more gross at the horizon, than they are at 30 or 40 degrees of elevation.

Fourthly, altho' the direct rays of the sun do not pass thro' the atmosphere of the earth, yet are there a great many of them, that turning aside, or, as they speak, by being broken by refraction, may enlighten the border of the moon, and consequently hinder the shadow from being exactly terminated.

Fifthly, it sometimes cometh to pass, that the shadow begins to touch the oriental edge of the moon, at the place where the spots are more obscure than those of the occidental border, which makes, that a man is not judge equally of the end and the beginning. we owe, sir, all this refining of astronomy to
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the modern observators: the ancients went more roundly to work in this matter, and Tycho-Brahe himself did not yet hit of it with all his subtilty.

But the moderns have been more ingenious to find out these difficulties, than to find out an expedient to surmount them; and we have more than once experienced in our observations, that it is not without extreme trouble, that one arrives at that exactness, which is required by the learned of our age; yet, have we this advantage, that we are a great many observators together, and that we are able, by communicating our notions and doubts one to another, to come nearer the truth. Besides, the heavens have supplied us with a great many eclipses of the moon; and, there have but few years passed, but we might have observed one or two.

But, amongst this great number, that, which happened on the eleventh of December 1685, was the most favourable to us; we were at that time at Siam: The king, to whom we had predicted it, and who desired to try the goodfals of our tables, was so surpris'd by conferring what he did behold with our prediction, that, from that time, he had some thoughts of detaining us near his person; or, at least to send somebody to find out some French astronomer in Europe for him. He offer'd of his own accord to build a magnificent observatory for us at Louveau, to render astronomy, if possible, as famous in India, as it was become in Europe, since the establishment of the royal observatory in Paris. And certainly, if ever the stars were the preface of future events, all the heavens seem'd then to promise us a happy success in this new undertaking; but it is not the sensible course of the planets, that rules our destinies here below; they proceed from an higher over-ruling power, and all their consequences are written in that mysterious book of divine providence, which bears all
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ages hath determined the different events of this world.

This project of the king of Siam, so favourable to France, to natural sciences, and to religion, was quickly put in execution; but the death of that good prince overthrew it almost in an instant, and changed the face of all things. The troubles, that then arose, forced our mathematician missionaries to absent themselves, and thereby caused, if I may so say, a kind of an eclipse, which hath so long deprived those people of the European sciences, and light of the gospel: yet, these clouds begin to be dispelled. They are very earnest to have us come back again; but we have learned by woful experience, not to rely too much upon the good will of man, but to place all our confidence in him, who alone can, when it seems good to him, bring light out of darkness.

This last essay, for all that, hath been of some use to astronomy; and we can assure you, that the lunar eclipses observed at Siam, Louveau, Pontichery, Peking, Nankim, Kiam-chau, and at Canton, with several other places of the East, will not only contribute to the regulating the celestial motions, but likewise to the perfecting geography.

Altho' the science of comets be not of so grand a consequence, yet it is not less admirable; nay, methinks the curiosity of the learned should be so much the more spurred on to attempt something in this way, as it is more difficult to satisfy it as to this point, for it is more than probable, that the wit of man will not be able in a long time to dive into the bottom of these marvellous phœnomena.

Comets are so rare, of so short continuance, and so different amongst themselves, that, if they be new bodies that are formed and destroyed in the heavens, it is very hard, and in a manner impossible to lay down general rules of their motions, or to prognosticate

noscitate their appearance and continuance, if they be real planets.

We have had the opportunity to observe two of them, the first was seen in a province in the kingdom of Siam, on the confines of Camboje, towards the sea-coast. It was in the month of August 1686. It cut the equator, passing from north to south, in the 111th degree of right ascension; and its own particular motion, that brought it still near the sun, quite absorb'd it, at least, into the sun-beams.

The second appeared at Pontichery, Molucco, and Pekin, in the month of December 1689. Its motion was contrary to that of the former, it removed from the sun, and came nearer to the southern pole, running over the constellations, Lupus and Centaurus, where it disappeared in the beginning of January to the ensuing year.

If we have but a smattering in the science of comets, yet in recompence we are sufficiently instructed in what relates to planets; and what our astronomers have discovered at Paris, since the establishment of the observatory, is already matter of comfort to us, for the negligence or ignorance of the ancients.

Amongst the different ways of going to work how to determine their place in the heavens, the most plain, and withal the most exact, is, to take notice of their conjunction with the fix'd stars. It is near a thousand years ago, that Saturn, the highest of all the planets, appear'd close by the equator, and near a star of the third magnitude, situated in the southern shoulder of Virgo. Tycho, in his time, observed it in the same sign; and we also have seen it near Spica Virginis, but with this advantage, that the telescopes, we made use of, make our observations incomparably more exact, than those of the ancients; who, for that purpose, made only use

use of their naked eye, always defective, at such a great distance, especially in respect of the stars, whose apparent diameter is augmented by the light, and by a kind of Corna of sparkling rays, according to the language of astronomers, that reflect from their whole body, which makes it many times appear where indeed it is not.

Whereas a good telescope makes them less glittering, rounds them, gives them their true big-ness, and so approaches them to the eyes, that one does likewise distinguish them from one another, even when they touch one another at the edges, or borders; and when they are just upon uniting together.

Thus we determined the place of Mars, by the approaching of two stars of the Scorpion's head, that of the moon, by her conjunction with the Antares, or heart of the Scorpion, and that of Venus, that passed near a star of the third magnitude belonging to the same sign.

This conjunction of Jupiter and Mars, that happen'd about the end of February 1687, did also take up several days; we were at that time at Louveau, where the king of Siam, who took a pride in astronomy, did observe it in person with an earnestness and uneasiness, that shewed more of superstition than natural curiosity.

He had a fancy that this conjunction would be fatal to him, and that it was an assured prognostication of his death. We endeavour'd, but all in vain, to undeceive him; by M. Constance, his principal minister of state, whom we made apprehensive, that the events of this lower world have no communication with the particular motion of the planets; and, that altho' our destiny should depend thereon, yet the king was no more concern'd in it than the most abject of his subjects, for whom the

sun and the stars do as well turn round, as for the greatest potentate upon earth.

Nevertheless these reasons, nor abundance of others, could not set him to rights: he still maintain'd, that his reign was not to last long, and that he should be a dead man within a few days: in effect he died the next year; but it was in vain for him to seek for the cause of his death in the heavens, which he carried about him for several years; an habitus distemper did extremely trouble him at that war time; and that, without doubt, was the true ground of his fear and prediction.

I do not know, sir, whether or no these observations will appear singular and odd to you; yet methinks, this, at least, which I am going to have the honour of relating to you, does a little deserve your attention.

You know that Mercury hitherto hath been the least known, and (if I may so say) the least tractable of all the planets; always absorbed in the rays of the sun, or in the vapours of the horizon, he continually flies, it seems, all the courtings and caresses of astronomers, who are put to as much trouble to fix him in the heavens, as chymists are to fix their mercury upon earth.

We read in the life of Charlemagne, that the mathematicians of his times, despairing of ever being able to observe him well, when he was the farthest remote from the sun, endeavour'd to find him in the sun itself, under which they suspected he might sometimes pass: they supposed they had there found him in the month of April 807, or rather 808, except the historian counted the beginning of the year at that time from Easter; in effect, a black spot appeared in the sun eight days, tho' his going in and coming out were hinder'd by a cloud.

I wonder

I wonder this observation could have been able to make them judge that this was Mercury, who is so far from spending eight days in running over such a little space, that he must, according to his natural course, finish it in a very few hours ; besides that, it is utterly impossible for a man to perceive him in the sun, without the help of a telescope, and that too a very good one. What therefore they then saw, or supposed to see, was, without doubt, a spot, not unlike those that have so often appeared since, but bigger than ordinary, and conspicuous enough to be discover'd by the bare sight.

Galleadus was more fortunate, Anno 1631, on the seventh of November. The observation he made of it hath rendered him so famous, that some authors, to do him honour, have dedicated their books to him, as a person to whom astronomy was infinitely obliged ; some others also have signaliz'd themselves by this curious disquisition ; we are the last that have had occasion to imitate them, but our observation peradventure may not deserve the meanest esteem of all those which have been made.

We were at Canton, a maritime town of China, and pretty well known by the Europeans traffick ; we applied ourselves to the particular studying of the motion of this planet, and that made us judge, that it would not be altogether impossible to discover it in the sun, on the tenth day of November 1690 ; to that end we prepared two excellent telescopes, the one of five feet, that bore a Reticula equal to the diameter, divided into twelve equal parts, and the other of twelve feet, with its Reticula composed of four threads, one whereof represented a parallel, the other the meridian, and the two others cut them at the angle of forty-five degrees ; we also rectified our periculi : besides all this, the heavens were exceeding clear and serene ; and bating the wind, which

was a little violent, we could wish for nothing to the exactness of our observation.

Mercury appeared to us like a black point or speck, which, entering into the body of the sun, run over it, in three hours and a half, or thereabouts; we exactly observed its time, entrance, departure, its distance from the ecliptick, its apparent swiftness, longitude and diameter. We understood likewise by that, with the greatest certainty in the world, that this planet hath no proper light of its own; that its body is opaque, and that it is, at least, sometimes less distant from us than the sun, the which could not formerly be determined but only by conjecture.

We owe, fir, these fine discoveries to the invention of optick-glasses and telescopes, as we do a great many other things, which in these latter ages are the subject of the new astronomy; so that as, by means of microscopes, we multiply the most simple bodies, and magnify the most minute and almost insensible ones; so likewise, by help of these telescopes, we approach to our eyes the most distant objects, and do abridge those infinite spaces that separate the firmament from the earth; art having in a manner forced nature to suffer men to have free commerce with heaven for time to come, and let mathematicians enter more easily into a kind of society with the stars.

We find, at present, mountains and precipices in the moon, we discern its least shadows, that increase or decrease, according to the different posture of the sun; we measure the Maculæ of planets, we have a shrewd guess of their colours, latitudes, and of their circular motion about their center. It is by that, that men have perceived that prodigious ring that appeared in the air, suspended about Saturn in form of a vault, or like a bridge, that would encompass the whole earth without arches, without piles, without
any

any other support, besides the uniform weight, and perfect continuity of its parts.

Galileo, and many other astronomers, have in vain put their brains on the rack, to explain this mystery; they look'd upon this planet as another Proteus, always changing, always differing from itself; to-day round, then oval, bye and bye armed with two Antæ's or handles, that open or shut, according to the time of the revolution; or else accompanied with two little stars, that vaulted up and down without ever forsaking it: lastly, cut in the middle with a broad fascia or swathing-band, whose extremities were extended far beyond its sphere.

We have a long time examined this wonderful work of the omnipotence of our Creator; and, notwithstanding we cannot but admire M. Hugen's ingenuity, who hath reduced to such a plain and facile system all these seeming irregularities, yet for all that, we must confess that we are ignorant of much more of it than that learned astronomer was able to discover to us.

It is less difficult to explain the different figures of Mars, Mercury, and Venus, which appeared to us sometimes round, sometimes gibbose, sometimes discomfited, and ever and anon in fashion of a bow, or sickle; and the truth is, when Venus approaches the sun, and when she is besides in her Perigæon, she appears in the telescope so little different from the new moon, that it is very easy for one to commit a mistake.

I do remember, that causing a Chinese to observe it in this posture, who had but little skill in astronomical secrets, he did no longer doubt, but presently gave his assent; and making him at the same time take notice of the moon, at a place in the heavens not far remote, he cried out for joy, and told me then, that he now comprehended that

which had always perplex'd him : *I did not know,* says he seriously, *how the moon could change face so often, and appear sometimes in the wax, and sometimes in the wane ; but now I perceive it is a body composed of several parts, which sometimes are taken in pieces, and then join'd together again after some certain times, for to day, at least, I see one half of it on one side, and one half on the other.*

The knowledge also that we have acquired by telescopes, *concerning the number of the stars, is likewise more curious. That large Faintness which embraces almost the whole heavens, which they commonly call, for whiteness, the Milky-way, is a Congeries of an infinite number of minute stars, each one of which, in particular, hath not strength enough to affect our eyes ; no more can the Nebulose, whose dim and confused light is like to a little cloud, or head of a comet, yet it is compounded of several stars ; so they reckon thirty-six of them in that of Præsepe Cancræ, twenty-one in that of Orion, forty in the Pleiades, twelve in the single star that makes the middle of the sword of Orion, five hundred in the extent of two degrees of the same constellation, and two thousand five hundred in the whole sign ; which hath given occasion to some to imagine, that the number of them is infinite.

At least it is true, that the prodigious bigness of each star, which, according to some, differ but little from the sun ; that is to say, whose globe is perhaps a thousand times bigger than that of the earth, which nevertheless appears but as a point in the heavens, ought to convince us of the vast extent of this universe, and of the infinite power of its Author.

I cannot, sir, finish this discourse, before I have spoken of some observations we have made of the Satellites : these are so many little planets that belong to the train of bigger ones, which were detected

Our age; they continually turn about Saturn, Jupiter, Mars, &c. some nearer, and some farther off from the center of their motion; they sculk sometimes behind their body, sometimes again they are plunged into their shadow, from whence they come out more splendid; nay, it even happens, that when they are between the sun and their planet, they eclipse one part of it. I have sometimes beheld, with great deal of delight, a black point, that run upon the disk of Jupiter, which one would have taken for a blemish, yet in effect was nothing else but the shadow of one of these Satellites, that caused an eclipse upon its globe, as the moon does upon the earth, when by her interposition she deprives it of the sun's light. We do not know for what particular use nature hath designed these Satellites in the heavens, but that, which we astronomers make use of, namely, is very useful for the perfection of geography; and since M. Cassini hath communicated his tables to the observators, one may easily, and in a very small time, determine the longitude of the principal cities of the world; insomuch that, if the irregular motion of ships would permit us to make use of the telescopes at sea, the science of navigation would be perfect enough to make long voyages with a great deal of safety.

We have observed the immerfions and emerfions of the Satellites Jovis at Siam, Louveau, Pontichery, at the Cape of Good Hope, and in several cities of China; but the observations made at Nimpo and Chenilay, that are the most eastern cities, have reduced the great continent to its true limits, by cutting off above five hundred leagues from the country, that never subsisted but in the imagination of the ancient geographers.

Since, Sir, I speak of what respects the perfection of geography, I shall tell you moreover, that we

have taken some pains to determine the latitude of the coasts, ports, and the most considerable cities of the East, by two other methods. First, by a great number of observations about meridian altitudes of the sun and stars. Secondly, by divers maps and sea charts, that our voyages have given us occasion to invent or perfect. I have a Ruttier, or directory, for finding out the course of a vessel from Nimpou to Pekin, and from Pekin to Hamcheu, where we have omitted nothing that may any way contribute to the perfect knowing of the country. *For the particularities of it are in my opinion too large, many, and even too troublesome to those, who, in these sorts of relations, do rather seek after delight than profit.*

I have also by me the course of the rivers that lead from Nankim to Canton, it is the work of two or three months, and a tedious one too I'll assure you, when one would do things to purpose. The map is eighteen feet long, and each minute takes up above four lines, or the third part of an inch, so that all the bye ways, the breadth of the river, the smallest islands, and least cities are there exactly and accurately set down. We had always the sea compass in our hand, and we always took care to observe, ever and anon upon the road, the meridian altitude of every particular star, to correct our estimate, and determine more exactly the latitude of the principal cities of the country.

Whereupon, sir, I cannot forbear making some reflections in this place, which may one day be useful perhaps for the resolving a material problem in physick. Men are not yet sure, whether all seas in the world be upon the level one with another. The generous principles of sound philosophy will have it, that all liquors of the same kind, that communicate one with another, do spread uniformly, whether

own weight, or by the pression of the air ;
last take the same surface. Most of the ex-
periments are in this point pretty congruous to rea-
son ; some later reflections have started a doubt
whether the sea had not really some incli-
nation, and were not more elevated in some certain
places than in others. What I have remarked, touch-
ing this last map I but now mentioned, seems to back
this last opinion.

For, in the provinces of Canton and Kiamfi, is
to be seen a mountain, out of which issue two
rivers ; the one flows towards the south, and, after
it has watered fifty leagues of the country, it dis-
embogues into the sea near the city of Yamtcheu ; the
other flows contrary, viz. to the north, crosses se-
veral provinces for the space of two hundred leagues,
and turns aside insensibly, and enters into the east
sea, or sea of Japan, insomuch that the emboucheurs
or mouths of the two rivers are not distant from
one another (if you do but even follow the coasts
that separate them) above three hundred leagues or
thereabouts.

Nevertheless, the northern river seems more ra-
pid in its whole course, than that of the south, and
being besides four times longer, it must needs be
that the seas, where both of them meet, have a dif-
ferent elevation, or, which is the same thing, are
not upon the self same level.

I shall not speak, sir, of several other maps, wherein
we have reformed part of the coasts of Coromandel,
of Pêcherie, Molucca, Mergui, and of Camboje,
because they have not yet attained to that per-
fection, that we hope we may be able to give them
hereafter. But yet I have two of them that at pre-
sent may venture to come abroad ; the one repre-
sents the entrance into the port of Nimpo, the most
dangerous in all the world, by reason of the mul-
titude

titude of isles and rocks that cover it on all sides, and put the skilfullest pilots to a stand. We have subjoined thereto the course from Siam to China, with a prospect of the chief coasts, or isles that are not met with by the way.

The other is still more curious, and indeed the only one in its kind; the little occasion the Europeans have hitherto had to sail into the great Tartan, obliged geographers to make use, in their descriptions of it, of I know not what memorandums, so little consistent with truth, that, as far as I know, they have purposely set themselves to deprive us of the knowledge of it. But the war breaking out some years ago, between the emperor of China and the duke of Muscovy, they have on all sides diligently examined the limits of realms, the bigness of provinces, the fertility of lands, rivers, mountains, deserts, and whatsoever could any way be advantageous to these two provinces, and might conduce, in time to come, to conclude a solid and lasting peace between them.

Besides these memoirs that fell into father Gerbillon's hands, the father hath also taken several journeys of three or four hundred leagues into the very heart of the country; going sometimes towards the west, sometimes to the south, observing, as much as possibly could be, the longitude and latitude of the most remarkable places; so that the map, that he hath drawn out, begins at present to supply us with a right idea of the disposition and situation of this vast country.

Amongst the things that are most singular in that country, one may observe a ridge of mountains, that are extended so far into the sea between the east and north, that it hath been, to this day, almost impossible for mariners to know or to double its cape, which makes some suspect, that this part of Asia may peradventure

venture be at this place contiguous to the firm land of America. We have, besides all this, made several observations concerning the variation of the needle upon tides, upon the length of a single pendulum, which may however contribute something to the perfection of arts and sciences.

Yet these general observations have not so much taken up our time but that we have spared some to examine what there is in the East most curious, in the way of natural philosophy, anatomy, and botany.

Our sojourning at Siam afforded us an opportunity to view several particular animals, which we seldom or never see in Europe; as for example, the elephant, the nature of which we have described, as also its docibleness, strength, courage, dexterity, the interior and exterior contexture of all its parts; together with divers other properties, that the very people of that country, that are accustomed to them, cannot chuse but admire.

There have we seen tigers, much different from those that are sometimes to be seen in France, and other countries; whether you look upon the colour, which is reddish fallow, interlaced with large black streaks, or whether you respect the bigness, which sometimes is equal to the bigness of horses; they call them Royal Tigers: those they call Water Tigers do exactly resemble a cat. They live upon fish, but do commonly live in woods, or upon the banks of rivers.

There are likewise to be seen your rhinoceros's, one of the oddest animals in the world, in my opinion; it hath some resemblance with a wild boar, only it is a little bigger, the feet of it somewhat thicker, and the body more clouterly shaped; its hide is covered all over with thick large scales, of a blackish colour, of an extraordinary hardness: they are divided
into

into little squares or buttons, rising about of an inch above the skin, in a manner like of the crocodile; its legs seem to be enclosed in a kind of boot, and its head wrapped about behind with a flat capuche, or monk's hood, which made the Portuguese to call him the Indian Monk: its head is thick and gross, its mouth not wide, its muzzle thrust out and armed with a long thick horn that makes him terrible to the very tigers, buffaloes, and elephants.

But that, which seems the most admirable in this animal, is its tongue, which nature hath covered with such a rough membrane, that it differs but little from a file, so that it fleas off the skin of all that it licks. In a word, as we see some animals here that make a good ragoust of thistles, whose little pricks tickle the fibres or the extremities of the nerves of the tongue; so likewise your rhinoceros takes delight in eating branches of trees, armed on all sides with stiff thorns: I have often given it some of them, whose prickles were very hard and long, and I admired how cunningly and greedily it bended them immediately, and champed them in its mouth without doing itself any harm. 'Tis true indeed, they sometimes drew blood of him, but that very thing made them more pleasant to the taste; and these little slight wounds made probably no other impression upon its tongue, than salt and pepper does upon ours.

What is to be seen, in the isle of Borneo, is yet more remarkable, and surpasseth all that ever the history of animals hath hitherto related to be most admirable. The people of the country assure us, as a thing notoriously known to be true, that they find in the woods a sort of beast called the Savageman, whose shape, stature, countenance, arms, legs, and other members of the body are so like ours,

that

that, excepting the voice only, one should have much ado not to reckon them equally men with certain barbarians in Africa, who do not much differ from beasts.

This wild, or Savage-man, of whom I speak, is endued with extraordinary strength, and notwithstanding he walks but upon two legs, yet is he so swift of foot, that they have much ado to outrun him. People of quality course him as we do stags here, and this sort of hunting is the king's usual diversion. His skin is all hairy, his eyes sunk in his head, his countenance stern and tanned; but all his lineaments are pretty proportionable, altho' harsh and thickened by the sun. I learned all these particulars from one of our chief French merchants, who hath remained some time upon the island; nevertheless, I do not believe a man ought to give much credit to such sorts of relations, neither must we altogether reject them as fabulous; but wait, till the unanimous testimonies of several travellers may more particularly acquaint us with the truth of it.

Falling upon a time from China to the coast of Coramandel, I did myself see, in the streights of Molucca, a kind of ape, that might make pretty credible that which I just now related concerning the Savage-man.

It marches naturally upon its two hind feet, which it bends a little, like a dog's that hath been taught to dance; it makes use of its two arms as we do; its visage is in a manner as well favoured as theirs of the Cape of Good Hope; but the body is all over covered with a white, black, or grey wool; as to the rest, it cries exactly like a child; the whole outward action is so human, and the passions so lively and significant, that dumb men can scarce express better their conceptions

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ceptions and appetites.* They do especially appear to be of a very kind nature; and, to shew their affections to persons they know and love, they embrace them, and kiss them with transports that surprize a man. They have also a certain motion, that we meet not with in any beast, very proper to children, that is, to make a noise with their feet for joy or spite, when one gives or refuses them what they passionately long for.

Altho' they be very big (for that I saw was at least four feet high) their nimbleness and slight is incredible: It is pleasure beyond expression to see them run up the tackling of a ship, where they sometimes play as if they had a particular knack of vaulting to themselves, or, as if they had been paid, like our rope-dancers, to divert the company.

Sometimes, suspended by one arm, they poise themselves for some time negligently to try themselves, and then turn, all on the sudden, round about a rope with as much quickness as a wheel, or a sling that is once put in motion; sometimes holding the rope successively with their long fingers, and letting their whole body fall into the air, they run full speed from one to the other, and come back again with the same swiftness. There is no posture but they imitate, nor motion but they perform; bending themselves like a bow, rolling like a bowl, hanging by the hands, feet, and teeth, according to the different fancies which their whimsical imagination supplies them with, which they act in the most diverting manner imaginable; but their agility to fling themselves from one rope to another, at thirty and fifty feet distance, is yet more surprizing.

So likewise, that we might the oftener have this pastime, we caused five or six of our powder-monkeys, or cabin-boys trained up to this way of climbing

climbing up the cords to follow them; then, our apes put such prodigious capers, and slid with so much cunningness along the masts, sail-yards, and tackling of the ship, that they seemed rather to fly than run, so much did their agility surpass all that ever we have observed in other animals.

Crocodiles being little known in Europe, and so common in the Indies, it has been our care to examine their property and whole structure. Peradventure, sir, our former dissections will be of some use hereafter, for the project they laid, and carried on pretty far in the academy, for the perfecting of anatomy. We have added thereto some anatomical remarks accompanied with figures about the Tockaies, so named, because they pronounce very frequently and distinctly this word. They are huge lizards or small crocodiles, found all over the woods in Siam, as also in the fields, and in houses.

The cameleon is likewise another sort of lizard of between eight and ten inches in length, which served for a subject to our observations; there are of them to be seen upon the coast of Coromandel, and we breed of them at our house in Pontichery, for they do not live upon air alone, as some naturalists have written, for they eat, and that very greedily. 'Tis true indeed, that, being of a very cold and moist temper, they can pass several days without aliment; but at the long-run, if you give them none at all, you shall see them dwindle away by degrees, and at last die for hunger.

Upon the whole, every thing is very odd in the cameleon, its eyes, head, and belly are exceeding big; and altho' it hath four parts, as a lizard, yet is it so very slow in all its motions, that it crawls rather than goes; and, if nature had not bestowed upon it

a tongue of a particular contexture, it could never catch the animals, in which does consist its nourishment: this tongue is round, thick, and at least a foot in length, it darts this tongue seven or eight inches out of its mouth with a marvellous slight: now the substance of it is so viscous, that it detains flies, grasshoppers, and other such like insects, if it touch them but never so lightly with its tip.

Its body is cover'd all over with a very fine skin, but is of a changeable colour, according to the various passions that agitate it: in joy it is of an emerald green mix'd with orange, etched with little grey and black strokes; choler makes it dusky and livid; fear pale, and of a faded yellow: by times all these colours, and many more, are confounded together, and at times there is compos'd such a pretty medley of shade and light, that nature does not afford a finer variety of shadowing, nor our finest pictures more lively, sweet, and proportional drawing.

They let me see likewise at Pontichery two other kinds of animals little known in Europe; the one is called Chien marron, that takes after the dog, wolf, and fox almost equally: it is of an indifferenc bigness, the hair is grey and reddish, it hath short taper'd ears, the snout sharp, the leg high, a long tail, a body slender and well shaped; it does not bark like dogs, but cries just as infants do: in a word, it is naturally voracious, and, when hunger pinches it, it enters into houses in the night, and falls upon people.

The second sort is the Mangoure, which, as to its exterior shape, comes very near the weazel, except only that its body is longer and bigger, the legs shorter, the snout slenderer, the eye quicker, and somewhat less wild.

This animal really is very familiar, and there is no dog that plays and fawns more prettily with a man

than this creature ; nevertheless it is angry, and not to be trusted when it eats, always snarling at that time, and falls furiously upon those who will be troubling it.

It loves hens eggs more than any thing ; but, because its chaps are not wide enough to seize on them, it strives to break them by throwing them aloft, or by rolling them an hundred ways upon the ground : but, if there chance to be a stone in its way, it presently lies upon it with its face downward, and, striding with its hinder legs, it takes the egg in its fore legs, and thrusts it with all its might under its belly, till it be broken against the stone.

It does not only hunt rats and mice, but serpents, to whom it is a mortal enemy, which it takes by the head so cunningly, that it receives no hurt by it. It is at no less enmity with cameleons, which at the very sight of it are seized with so mortal a fear, that they become immediately as flat as a flounder, and fall down half dead ; whereas at the approach of a cat, or dog, or some other more terrible animal, they swell, are enraged, and betake themselves either to their own defence, or to assault them.

India being a very hot country, and withal moist, produces a great number of other animals ; there is there especially abundance of serpents of all sizes, and so pretty in respect of the variety of colours, that, if it were not for the natural antipathy that we have for this kind of beast, I scarce know any thing that the eye could take greater delight in. The people of Siam are not so nice as we in this respect ; they catch a prodigious number of them in the woods, and expose them to sale in the markets like fowls.

Yet there is a particular kind of them that they do not eat, they are present poison, and that without relief ; they call them Cobra capela : some others

are short, and of a triangular form, so that they always creep upon one of their three faces; others also are still more odd, have no tail, their extremities are terminated by two heads exactly alike in appearance, but very different in effect, inasmuch as the one hath not, as the other, the common use of its organs; for in these latter the lips are join'd, the ears stopp'd, the eye-lids quite cover the eyes, whilst the other eats, sees, hears, and guides all the rest of the body.

Yet an Englishman at Madras, who kept one in his house for curiosity sake, assured me, that every six months the organs of this second head disclosed by little and little, and that, on the contrary, those of the opposite head, by closing themselves, ceased to perform their ordinary functions; that at the end of the like number of months, they were both restored to their pristine state, and divided in that manner between them, each in its turn, the care and government of the machine.

But God being no less wonderful in the least things than he is in the greatest, there are a prodigious number of insects that might deserve the most serious reflections. There you may see certain flies that nature hath painted of such a lively yellow, so polish'd and shining, that the most curious gilding does not come near it. Some others are but points of light, that always glow, and emit rays all night long; all the air appears as if set on fire with it when they fly; and, when they light upon leaves or branches, the trees resemble, afar off, those fire-works they make in the Indies for solemn illuminations.

Their white pismires, every where to be found, what care soever men take to destroy them, are very famous by reason of the great inconveniences they produce, and for their natural properties; they are exceeding small, of a soft substance, white, and sometimes

sometimes a little ruffety ; they are multiplied ad infinitum ; and, whensoever they are once got into an house or apartment, nothing but the black pismires can drive them out ; they have such sharp teeth, and so penetrating, that they not only pierce through, in one night, the greatest bails, cloth, wool, silk, and all other stuffs, but even cabinets and cupboards, the wood of which becomes in a few days all worm-eaten ; they even spoil wood, copper, and silver, upon which you may sometimes discern the signs and marks of their little teeth : notwithstanding all this, there is great probability that this effect proceeds more from the particular quality of the Saliva, which is a kind of dissolving Menstruum, and acts at that time much after the same manner as Aqua fortis does here upon our metals.

Even the grasshoppers are extraordinary ; there are some of them in Siam that breed upon the boughs of trees, and are, if I may venture to say so, their fruit in a manner ; for the leaves, preserving their natural figure and colour, grow somewhat thicker, their sides throw out on each hand a kind of green filaments, in fashion of long legs, one of the extremities of the leaf extends like a tail, and the other waxes round like a head, all which, at length, is animated, and metamorphosed into a grasshopper : this is what the people of the country report, who pluck them from the branches themselves ; we have seen great store of them, and it is true that the leaf appears intire with its fibres, or at least nothing does more resemble a leaf than the body of this animal. If this be true, this tree is no less to be wonder'd at than that whose leaves dropping into the sea, in a short time, turn to Soland geese, as some naturalists would make us believe.

It would here be a fit place to speak to you concerning the strange trees we have met with in the East,

but, if I am not mistaken, I have had formerly the honour to discourse with you about them at large; especially of those that produce varnish, tea, cotton, tallow, pepper, and many others, all of them singular in their kind, and very profitable for commerce.

I have had also the honour, sir, to present you with about four hundred China plants, drawn out in their natural colours, and copied after those that are kept in the closet of the emperor of China: This is it that does chiefly compose the herbal of China, and which, doubtless, will enrich ours, especially when we shall have the translation of the book where the vertues and use of all these simples are incomparably well explained.

Neither shall I enlarge more upon our observations that relate to the beauty, bigness, and diversity of Indian birds; for, altho' that may be the finest part of the history of animals, yet there has been so much said of it already in the foregoing relations, that it would be to no purpose to speak to you of it more at large.

But I cannot forbear now in the conclusion to relate to you the greatest curiosities which the sea hath furnished us with. There are fish, whose blood is as hot as that of a man, others respire in the air like other terrestrial animals; we see some of them fly like birds, that croak at the bottom of waters like toads, and bark like dogs: some have heads pretty like ours; they call them in Siam, Mermaids: in some certain ones the flesh is so firm, that it nourisheth as much as meat; in others, it is so soft, that it may not so properly be called fish, as an indigestedness of slimy, gross, and transparent matter, wherein no organ is to be discerned, yet is it quick, it moves, and even swims methodically. In a word, altho' the most part of them be good to eat, yet I have seen some that are poisonous, which infallibly

Infallibly lame the fishermen when they can strike
a fish into them.

I to bear all the other wonders of the sea, that
no ways come short of those in the heavens and in
the earth, that I may speak more particularly of what
we have learned of the birth, nature, and fishing
of pearls. You may assure yourself, that these are
of that kind of description upon which the publick
rely; for we derive them from the fountain
head. This is what father Bouchet, the missionary
of Madure, sent by the king into the Indies, left
me his own self in writing.

Men know well enough, that pearls are engen-
dered in a sort of oyster found in the Indies, between
Cape Comarin and the channel de la Croux, which oc-
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three whole months without any intermission, or whe-
ther it be that they are sometimes forced to employ
above an hundred and fifty men therein all at once;
so that, before they engage in it for good and all,
they begin upon trial, from whence they can tell,
more or less, what profit they may possibly hope for.

Now, if the pearls of the first oyster be fair, big,
and in great number, then the whole body of fishers
are in a readiness against the 15th of March, the time
when the Paravas (people of that coast) do always be-
gin that precious fishing. In the last, there are but
eight hundred barques, yet sometimes there are to be
seen to the number of three thousand. At that time
the Hollanders arm two pataches, to convoy the
fleet, and defend them from pirates.

The crew of each barque consists of fifty or sixty
mariners, amongst whom there are twenty divers,
one of which hath his two assistants, which for that
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men is distributed after the following manner; each

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gain is distributed after the following manner; each

diver is bound to pay six crowns to the Hollander which hath sometimes amounted to a million. Every eight days, they fish one whole day for the profit of the skipper of the barque; the first throw of the nets is for him; they give the third part of what remains to the assistants, and the surplus belongs to the divers; but yet, the Hollanders do not always give them leave to dispose of it as they please. So that these poor wretches do often complain of their hard fate, and bewail their loss, when they think of the time they lived under the the dominion of the Portuguese.

When fishing-time is come, this is the manner of the Paravas's preparing themselves for it: The whole fleet puts out to sea as far as seven, eight, or ten fathom water, off of certain huge mountains, which they discover far up in the country, they have learned by experience, that this is the most commodious latitude of the coast, and the place where there is the most copious fishing.

Soon after casting anchor, every diver fastens under his belly a good big stone six inches diameter, a foot long, cut archwise on that side which is applied to his skin; they make use of it as ballast, that they may not be carried away by the motion of the water, and to go more firmly through the waves; besides that, they tie a second heavy one to one of their feet, that presently sinks them to the bottom of the sea, from whence they quickly draw it into the barque by help of a small cord: but because the oysters are often fixed to the rocks, they surround their fingers with copper plates for fear of hurting them in pulling the oysters with violence; some others also use iron forks for the same purpose.

Lastly, every diver carries a great net, in fashion of a sack, hung about his neck by a long rope, the end of which is fastened to the side of the barque; the sack is designed to receive the oysters they pull

up during the fishing, and the rope to draw up the fishers when they have filled their sack.

In this equipage they precipitate themselves, and go down into the sea above sixty feet deep. Since they must lose no time, so soon as they touch the bottom, they run to and fro upon the sand, upon any earth, and amongst the craggy rocks, snatching hastily the oysters they meet with in their way.

At what depth soever they be, the light is so great that they discern what happens in the sea, as easily as tho' they were upon land. They sometimes see monstrous fish, from which the christians defend themselves by crossing themselves; which hitherto hath preserved from all accidents. For, as for those who are Mahometans or Pagans, whatsoever shift they make by troubling the water, or flying away, to avoid them, many have been devoured by them; and, of all the dangers in fishing, this is, without all doubt, the most ordinary and greatest.

In fine, the expert divers remain commonly under water half an hour, others are no less than a good quarter of an hour. They do no more but hold their breath, without using, for that purpose, either oil, or any other liquor; custom and nature having endued them with that power, which all the art of philosophers hath not been able to this day to communicate to us.

When they perceive they can hold no longer, they pull the rope to which their sack is fastened, and tie themselves very fast to it by their hands; then, the two assistants, that are in the barque, hoist them aloft in the air, and unload them of what they have got, which is sometimes five hundred oysters, sometimes fifty or an hundred only, according to their good or bad luck. Amongst the divers, some rest a little to refresh themselves in the air; others do not require it, and incontinently plunge again into the water, continuing in that manner this violent exer-

cise without respite, for they feed but twice a-day, once in the morning, before they put to sea, and in the evening when night forces them to make to shore.

It is upon this shore where they unload all the barques, and the oysters are carried into a great many little pits digged into the sand, about five or six feet square. The heaps they throw in rise sometimes to the height of a man, and look like a company of little huts, that one would take at a distance for an army ranged in battalia.

They leave the oysters in this manner, till such time as the rain, wind, or sun, forces them to open of themselves; which soon kills them, the meat corrupts and grows dry, and they pull out the pearls very easily; so that they all fall into the pit. According as they pull out the mother of pearl, so they call the shells, on the outside like those of your common oysters; but within more like silver, and more glittering: the largest are near as big as your hand; the meat is very delicate, and, if the pearls there found be, according to the opinion of some physicians, certain stones, that are bred by the ill constitution of the oyster's body, as it happens in men, and in the bezoar, this distemper does not sensibly alter the humours thereof; at least the Paravas, that eat of them, find not any difference between those that have pearls, and those that have none.

When they have cleansed the ditch of its most gross filth, they sift the same over and over again, to separate the pearls from it. Nevertheless, what care soever they take, abundance of them are lost; and, altho' they return often thither, yet they still find them, in a pretty considerable number, some years after the fishing.

And this is all, sir, that respects the place, and ordering of this rich fishing. I shall add some other particular.

particulars, that will serve more fully to inform you of the nature and quality of pearls.

They are found scattered here and there in the whole substance of the oyster, in the veil that covers it, in the circular muscles that terminate there in the ventricle, and, in general, in all the carnosus and muscular parts; so that it is not probable that they be in the oyster, what the eggs are in the hen, and spawn in fish: for besides, that nature hath not determined them any particular place for to be formed in, anatomists, who have carefully examined this matter, can discover nothing that hath any analogy with that which happens in respect of other animals.

One may, nevertheless, say, that whereas there are in a pullet an infinite number of eggs in form of seed, one of which grows and augments, whilst the others remain in a manner in the same state: so likewise in each oyster may be commonly observed one pearl bigger, better formed, which sooner comes to perfection than all the rest. But this pearl hath no fixed place, and it is sometimes in one place, and sometimes in another. Yea, and it sometimes so falls out, that this pearl becomes so big, that it hinders the mother of pearl to close, and then the oyster dies and corrupts.

The number of the pearls is no less indefinite, oftentimes all the meat of the oyster is set thick with them; but it is a rare thing to find more than two of them of any tolerable bigness.

They are naturally white, more or less according to the quality of the mother. The yellow and the black are extraordinary rare, and of small value; yet Tavernier reports, that he had six of them given him in the Indies that were perfectly black, resembling jet, and much esteemed in the country. If this author doth not intend to impose upon us in this point, as he doth in many others, perhaps he was deceived

deceived himself: however, it is most certain, that, all along the coast of La Pescherie, they make no account of them; and the fishermen themselves throw them away, as good for nothing.

This variety of colours is, without doubt, caused in the pearls, by the different parts of the oyster where they are formed; so that when chance or nature hath directed the seed into the mesentery and liver, or, rather into the parts that are instead of them: (For there hath been observed in an oyster a cavity large enough, where are discovered two overtures, that terminate at two small membranes, where the chyle is chiefly purified, and discharges itself of all its gross particles; the intestines of this animal not being accompanied with lacteal and meseriatic veins.) When, I say, the part is inclosed in these cavities, and bile and impurities of the blood may very well alter the natural whiteness, and make them either yellow or black, so likewise one may observe, that these pearls are not transparent, but sullied, and loaded with a gross substance.

As to what relates to their exterior form, it is sufficiently known, seeing they are as common in Europe as in the Indies. Their different figure gives them different names; so we say, a pearl in point, or in pear; oval pearl, round pearl, baroque pearl, that is, flat on one side and round on the other; one may add irregular pearl; for some of them are found with many little angles, gibbous, flat, and generally in all sorts of figures.

Upon the whole, if it be a difficult thing to give an account how pearls grow in oysters, it is no less difficult to understand the manner how oysters are generated in the sea. Some say it fares with this sort of fish as with all others, that produce eggs, the exterior substance whereof, soft at first, and viscous, grows hard at last by degrees, and turns to a shell.

What

What the Paravas have observed, and which I will inform you, deserves to be carefully minded.

At the times when rain falls, the brooks of the adjacent lands, that empty themselves all along the West, flow near two leagues upon the surface of the sea, without mixing with it: This water does thus swim above some time, keeping its natural colour, but it clots afterwards by the heat of the sun, which reduceth it into a kind of light transparent cream. Soon after it is divided into an infinite number of parts, every one of which seems animated, and moves up and down like so many little insects. The fish sometimes catch some of them as they float, but as soon as they taste of them they quickly leave them.

Of what nature soever these minute animals may be, certain it is, that they engender upon the surface of the water; their skin grows thick, hard, and becomes last of all so ponderous, that they descend by their own proper weight to the bottom of the sea. The Paravas do moreover assure us, that they assume at last the form of an oyster.

This is a system whereof the virtuoso's did probably never dream, which experience hath discovered to the Barbarians; and, in effect, it is in these places only that pearl is found, and the rainiest years prove likewise the best for fishing.

I shall add moreover, to undeceive those who are wedded to that opinion of the ancients, that oysters remain always at the bottom of the sea. Formerly it was believed they rose every morning up to the surface of the water; and that they open'd their nacre, or shell, to receive in the dew of heaven, which, like a melted pearl, insinuated itself into the meat of the oyster; was fix'd by means of its salts, and there at last assumed the colour, figure, and hardness of pearls; not much unlike some certain liquors

liquors that are transmuted into crystals in the earth, or as some flowers are transformed into honey and wax in the bee-hives : all this is ingenious and pretty ; but the worst of it is, 'tis all false ; for these oysters are strongly fastened to the rock, and never did any fisher see one to float upon the superficies of the water.

Notwithstanding pearls are found in several places, yet those of La Pescherie are the most valued, for they never lose their lustre ; others turn yellow, or of a pale decayed white. As to the true value it is very hard to determine any thing for certain ; the biggest of all, that was found in the last fishing, was sold but at six hundred crowns.

I have sometimes asked the divers, if they did not now and then find coral at the bottom of the sea ; they answered, that they, being for the most part busied in what concerns seeking for pearl, took no great notice of any thing besides ; that, nevertheless, they found, from time to time, branches of black coral : there is some of it, added they, which altho' it be pretty hard at the bottom of the water, yet becomes much more so, when it hath been some time exposed to the air : but the greatest part of it hath acquir'd, even in the sea, all its natural hardness. It sticks fast to the rocks, and when we cast anchor in foggy weather, it often happens that our anchor catches hold on some branches of black coral, and brings along with it whole trees ; but it is very rare to find any red coral all along the coast of La Pescherie.

I shall here make a reflection that not many have made, viz. That the coral-tree hath no root : some of it was shown in Rome, in father Kercher's Museum, that sprung out of several stones ; some of them have been after that pull'd away, and the coral had not only no root, but was not so much as tied
by

by any fibre, or any the least filament whatsoever. There also were seen several branches of coral issuing from a nacre of pearl; and in cardinal Barbarin's closet, there is still to be seen a shrub of coral, whose foot is black, the trunk white, and the very top of all red.

Thus doth nature, fir, disport herself in the great abyss, as well as in the other parts of the universe, by the production of prodigious numbers of things equally profitable and precious, which she bestows not to excite and irritate mens concupiscence, or to foment their sottish pride, but to serve them for ornaments, as reason, and the decency of every state requires or permits.

Nay, perhaps, fir, these beauties of the universe were created, not so much to adorn the body, as to exercise the mind: *Reliquit mundum disputationi eorum.* For, of all natural pleasures, the most innocent, and substantial, without all doubt is the study of nature, and the consideration of the marvels it contains in its womb. When one hath once run over the ground work of divine wisdom, and penetrated into the mysteries of it; this general view of so many beauties hath more powerful charms, and begets in our spirit a more taking and affecting image and representation, than all that the senses and passions are ever able to present to us.

You know it, fir, better than any body; you, I say, who by your particular study, and your continual correspondence with the learned, have acquir'd, in so short time, so many notions in all the different kinds of erudition; and certainly, that constant application that you every day afford, in reference to the perfection of arts and sciences, sufficiently declares, that nothing can more profitably and pleasantly take up the time of a gentleman and honest man.

But

But what is still more singular, you sanctify all this knowledge, by the good improvement you make of it: you bring it, I may so say, to the sanctuary; you make use of it in the pulpit of truth, to make our mysteries more intelligible, and, not satisfied with the ordinary philosophy and eloquence, you do thereby become a christian philosopher, and an evangelical orator. I am with all respect,

S I R,

Your most humble

and most obedient Servant,

L. J.

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