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0521772044 - Margaret Cavendish, Duchess of Newcastle: Observations upon
Experimental Philosophy - Edited by Eileen O'Neill

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Observations upon Experimental Philosophy

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To
Her Grace
The
Duchess of Newcastle,
On her *Observations upon*
Experimental Philosophy

This book is book of books, and only fits
Great searching brains, and quintessence of wits;
For this will give you an eternal fame,
And last to all posterity your name:
You conquer death, in a perpetual life;
And make me famous too in such a wife.
So I will prophesy in spite of fools,
When dead, then honoured, and be read in schools.
And *ipse dixit* lost, not he, but she
Still cited in your strong philosophy.

William Newcastle

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To His
Grace
The
Duke of Newcastle

My Noble Lord,

In this present treatise, I have ventured to make some observations upon experimental philosophy, and to examine the opinions of some of our modern microscopical or dioptrical writers: and, though your Grace is not only a lover of virtuosos, but a virtuoso yourself, and have as good, and as many sorts of optic glasses as anyone else; yet you do not busy yourself much with this brittle art, but employ most part of your time in the more noble and heroic art of horsemanship and weapons, as also in the sweet and delightful art of poetry, and in the useful art of architecture, etc. which shows that you do not believe much in the informations of those optic glasses, at least think them not so useful as others do, that spend most of their time in dioptrical inspections. The truth is, My Lord, that most men in these latter times, busy themselves more with other worlds, than with this they live in, which to me seems strange, unless they could find out some art that would carry them into those celestial worlds, which I doubt will never be; nay, if they did, it would be no better than Lucian's,¹ or the Frenchman's² art, with bottles, bladders, etc. or like the man's that would screw himself up into the moon:³ And therefore, I confess, I have but little faith in such arts, and as little in telescopical, microscopical, and the like inspections; and prefer rational and judicious observations, before deluding glasses and experiments; which, as I have more at large declared in this following work, so I leave it to your Grace's perusal and judgment, which I know is so just, so exact,

¹ Lucian of Samosata (c. 120–200 AD) wrote two satirical dialogues about travel to other worlds: *Ikaromenippos, or the Sky Man* and *A True Story*.

² Probably a reference to Savinien de Cyrano de Bergerac, *Histoire comique contenant les états et empires de la lune* [Comic Story Containing the States and Empires of the Moon] (Paris, 1657); but cf. Pierre Borel, *Discours nouveau prouvant la pluralité des mondes* [New Discourse Proving the Plurality of Worlds] (Geneva, 1657).

³ Probably a reference to John Wilkins, *The Discovery of a New World; or, A Discourse Tending to Prove, That (It Is Probable) There May Be Another Habitable World in the Moon . . .* (London, 1638); but cf. Domingo Gonsales, *The speedy Messenger* [Francis Godwin], *The Man in the Moone: or A Discourse of a Voyage Thither* (London, 1638).

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and so wise, that I may more safely rely upon it, than all others besides;
and if your Grace do but approve of it, I care not if all the world condemn
it; for, your Grace's approbation is all that can be desired from,

My Lord,

Your Grace's honest wife, and humble servant,
M.N.

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To the
Most Famous
University
of Cambridge

Most Noble, and Eminently-Learned,

Do not judge it an impertinency, that now again I presume to offer unto you, another piece of my philosophical works; for, when I reflect upon the honour you have done me, I am so much sensible of it, that I am troubled I cannot make you an acknowledgment answerable to your great civilities.

You might, if not with scorn, with silence have passed by, when one of my sex, and, what is more, one that never was versed in the sublime arts and sciences of literature, took upon her to write, not only of philosophy, the highest of all human learning, but to offer it to so famous and celebrated an university as yours; but your goodness and civility being as great as your learning, would rather conceal, than discover or laugh at those weaknesses, and imperfections which you know my sex is liable to; nay, so far you were from this, that by your civil respects, and undeserved commendations, you were pleased to cherish rather, than quite to suppress or extinguish my weak endeavours.

For which favour, as I found myself doubly indebted to you, so I thought it my duty to pay you my double acknowledgments; thanks, you know, can never be unseasonable, when petitions may; neither can they be displeasing, when petitions often are troublesome: And since there is no sacrifice, which God is more delighted with, than that of thanksgiving, I live in hopes you will not refuse this repeated offer of gratitude, but favourably, as a due to your merits, receive it from her, who both of your ingenuity, learning and civility is the greatest admirer, and shall always profess herself,

Your most obliged and devoted servant,
M.N.

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The Preface to the Ensuing Treatise

It is probable, some will say, that my much writing is a disease; but what disease they will judge it to be, I cannot tell; I do verily believe they will take it to be a disease of the brain; but surely they cannot call it an apoplectical or lethargical disease: Perhaps they will say, it is an extravagant, or at least a fantastical disease; but I hope they will rather call it a disease of wit. Let them give it what name they please; yet of this I am sure, that if much writing be a disease, then the best philosophers, both moral and natural, as also the best divines, lawyers, physicians, poets, historians, orators, mathematicians, chemists, and many more have been grievously sick: and Seneca, Pliny, Aristotle, Cicero, Tacitus, Plutarch, Euclid, Homer, Virgil, Ovid, St. Augustine, St. Ambrose, Scotus, Hippocrates, Galen, Paracelsus, and hundreds more, have been at death's door with the disease of writing.⁴ Now, to be infected with the same disease, which the devoutest, wisest, wittiest, subtlest, most learned and eloquent men have been troubled withal, is no disgrace; but the greatest honour that can happen to the most ambitious person in the world: and next to the honour of being thus infected, it is also a great delight and pleasure to me, as being the only pastime which employs my idle hours; insomuch, that, were I sure nobody did read my works, yet I would not

⁴ The "divines" include Christian neoplatonist St. Augustine (354–430 AD) and Franciscan logician and metaphysician John Duns Scotus (1265/6–1308); St. Ambrose, Bishop of Milan (c. 339/40–397 AD) was originally a lawyer; Hippocrates of Cos (c. 460–c. 380 BC) and Galen of Pergamum (129–? 199 AD) are famous physicians of the ancient world; Homer (? prior to 700 BC), Virgil (70–19 BC) and Ovid (43 BC–17 AD) are ancient epic poets; the "historians" are Cornelius Tacitus (c. 56 – c. 115 AD) and Plutarch (before 50 AD – after 120 AD); philosopher Marcus Tullius Cicero (106 BC–43 BC) is admired as a master of the oration; Euclid (fl. c. 300 BC) is the famed mathematician of Alexandria; and the "chemist" is physican/alchemist Theophrastus Bombast von Hohenheim, known as "Paracelsus" (? 1493–1541).

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quit my pastime for all that: for although they should not delight others, yet they delight me; and if all women that have no employment in worldly affairs, should but spend their time as harmlessly as I do, they would not commit such faults as many are accused of.

I confess, there are many useless and superfluous books, and perchance mine will add to the number of them; especially it is to be observed, that there have been in this latter age, as many writers of natural philosophy, as in former ages there have been of moral philosophy; which multitude, I fear, will produce such a confusion of truth and falsehood, as the number of moral writers formerly did, with their over-nice divisions of virtues and vices, whereby they did puzzle their readers so, that they knew not how to distinguish between them. The like, I doubt, will prove amongst our natural philosophers, who by their extracted, or rather distracted arguments, confound both divinity and natural philosophy, sense and reason, nature and art, so much as in time we shall have, rather a chaos, than a well-ordered universe, by their doctrine: Besides, many of their writings are but parcels taken from the ancient; but such writers are like those unconscionable men in civil wars, which endeavour to pull down the hereditary mansions of noblemen and gentlemen, to build a cottage of their own;⁵ for, so do they pull down the learning of ancient authors, to render themselves famous in composing books of their own. But though this age does ruin palaces, to make cottages; churches, to make conventicles; and universities to make private colleges; and endeavour not only to wound, but to kill and bury the fame of such meritorious persons as the ancient were; yet, I hope God of his mercy will preserve state, church, and schools, from ruin and destruction: Nor do I think their weak works will be able to overcome the strong wits of the ancient; for, setting aside some few of our moderns, all the rest are but like dead and withered leaves, in comparison to lovely and lively plants; and as for arts, I am confident, that where there is one good art found in these latter ages, there are two better old arts lost, both of the Egyptians, Greeks, Romans, and many other ancient nations; (when I say lost, I mean in relation to our knowledge, not in nature; for nothing can be lost in nature.) Truly, the art of augury was far more beneficial than the lately invented art of micrography; for I cannot

⁵ Cavendish chronicles such acts and her family's losses during the English Civil War in *Life*.

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perceive any great advantage this art doth bring us. The eclipse of the sun and moon was not found out by telescopes; nor the motions of the loadstone, or the art of navigation, or the art of guns and gunpowder, or the art of printing, and the like, by microscopes; nay, if it be true, that telescopes make appear the spots in the sun and moon, or discover some new stars, what benefit is that to us? Or if microscopes do truly represent the exterior parts and superficies of some minute creatures, what advantage it our knowledge? For unless they could discover their interior, corporeal, figurative motions, and the obscure actions of nature, or the causes which make such or such creatures; I see no great benefit or advantage they yield to man: Or if they discover how reflected light makes loose and superficial colours, such as no sooner perceived but are again dissolved; what benefit is that to man? For neither painters nor dyers can enclose and mix that atomical dust, and those reflexions of light to serve them for any use. Wherefore, in my opinion, it is both time and labour lost: for, the inspection of the exterior parts of vegetables, doth not give us any knowledge how to sow, set, plant, and graft; so that a gardener or husbandman will gain no advantage at all by this art: The inspection of a bee, through a microscope, will bring him no more honey; nor the inspection of a grain, more corn; neither will the inspection of dusty atoms, and reflexions of light, teach painters how to make and mix colours, although it may perhaps be an advantage to a decayed lady's face, by placing herself in such or such a reflexion of light, where the dusty atoms may hide her wrinkles. The truth is, most of these arts are fallacies, rather than discoveries of truth; for sense deludes more than it gives a true information, and an exterior inspection through an optic glass, is so deceiving, that it cannot be relied upon: Wherefore, regular reason is the best guide to all arts, as I shall make it appear in this following treatise.

It may be, the world will judge it a fault in me, that I oppose so many eminent and ingenious writers: but I do it not out of a contradicting or wrangling nature, but out of an endeavour to find out truth, or at least the probability of truth, according to that proportion of sense and reason nature has bestowed upon me: for as I have heard my noble lord⁶ say, that in the art of riding and fencing, there is but one truth, but many

⁶ I.e., her husband William Cavendish.

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falsehoods and fallacies: So it may be said of natural philosophy and divinity; for there is but one fundamental truth in each,⁷ and I am as ambitious of finding out the truth of nature, as an honourable dueler is of gaining fame and repute; for, as he will fight with none but an honourable and valiant opposite, so am I resolved to argue with none but those which have the renown of being famous and subtle philosophers; and therefore as I have had the courage to argue heretofore with some famous and eminent writers in speculative philosophy;⁸ so have I taken upon me in this present work, to make some reflexions also upon some of our modern experimental and dioptrical writers.⁹ They will perhaps think me an inconsiderable opposite, because I am not of their sex, and therefore strive to hit my opinions with a side-stroke, rather covertly, than openly and directly; but if this should chance, the impartial world, I hope, will grant me so much justice as to consider my honesty, and their fallacy, and pass such a judgment as will declare them to be patrons, not only to truth, but also to justice and equity; for which heaven will grant them their reward, and time will record their noble and worthy actions in the register of fame, to be kept in everlasting memory.

⁷ Cf. Cavendish's publication of her husband's view that since natural philosophers are "all guessers, not knowing, it gives every man room to think what he lists . . ." (*Opinions*, 1663, p. 459).

⁸ In *Phil. Letters* Cavendish had critically examined the views in the following texts: Thomas Hobbes, *Leviathan* (London, 1651) and *Elements of Philosophy, The First Section concerning Body* (London, 1656); René Descartes, *Discours de la methode . . . Plus la dioptrique. Les meteores. Et la geometrie . . .* [Discourse on the Method . . . And in addition the Dioptrics. The Meteorology. And the Geometry] (Leiden, 1637) and *Principia philosophiae* [Principles of Philosophy] (Amsterdam, 1644); Henry More, *An Antidote Against Atheisme* (London, 1653) and *The Immortality of the Soul* (London/Cambridge, 1659); Johannes Baptista Van Helmont, *Oriatrike, or, Physick Refined . . .*, tr. J.[ohn] C.[handler] (London, 1662); Walter Charleton, *Physiologia Epicuro-Gassendo-Charltoniana, or a Fabrick of Science Upon the Hypothesis of Atoms* (London, 1654) and William Harvey, *Exercitationes de generatione animalium* [Anatomical Exercises On the Generation of Animals] (London, 1651).

⁹ The principal "experimental and dioptrical writers" to whom Cavendish will now critically respond are: Thomas Hobbes, René Descartes, Henry Power, Robert Hooke and Robert Boyle.

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To the Reader

Courteous Reader,

I do ingenuously confess, that both for want of learning and reading philosophical authors, I have not expressed myself in my philosophical works, especially in my *Philosophical and Physical Opinions*, so clearly and plainly as I might have done, had I had the assistance of art, and the practice of reading other authors: But though my conceptions seem not so perspicuous in the mentioned book of philosophical opinions; yet my *Philosophical Letters*, and these present *Observations*, will, I hope, render it more intelligible: which I have writ, not out of an ambitious humour, to fill the world with useless books, but to explain and illustrate my own opinions. For, what benefit would it be to me, if I should put forth a work, which by reason of its obscure and hard notions, could not be understood? especially it being well known, that natural philosophy is the hardest of all human learning, by reason it consists only in contemplation; and to make the philosophical conceptions of one's mind known to others, is more difficult than to make them believe, that if A. B. be equal to C. D. then E. F. is equal to A. B. because it is equal to C. D. But that I am not versed in learning, nobody, I hope, will blame me for it, since it is sufficiently known, that our sex being not suffered to be instructed in schools and universities, cannot be bred up to it. I will not say, but many of our sex may have as much wit, and be capable of learning as well as men; but since they want instructions, it is not possible they should attain to it: for learning is artificial, but wit is natural. Wherefore, when I began to read the philosophical works of other authors, I was so troubled with their hard words and expressions at first, that had they not been explained to me, and had I not found out some of