

The Maudslay Scholarship Foundation
(Registered Charity Number 313247)

Trustees' Report and Financial Statements
for the Year Ended 31st December 2023 with a summary of progress to June 2024

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TRUSTEES' REPORT FOR THE YEAR ENDED 31st DECEMBER 2023

The Trustees present their report and the financial statements for the Maudslay Scholarship Foundation for the year ended 31st December 2023.

1 Overview**1.1 Origin of the Maudslay Scholarship Foundation (MSF)**

The Maudslay Society was founded in 1942 by former employees and apprentices of Maudslay, Sons & Field with the primary objective of perpetuating the name of Henry Maudslay (1771-1831), a pioneer of precision engineering. Funds were raised in order to achieve this end through the endowment of a scholarship in engineering. In accordance with the Declaration of Trust dated 11 November 1946 and Order No. 67/719T (30.5.67) made by the Secretary of State for Education and Science, which created the present body of trustees, the main aim is 'The awarding of scholarships, to be called Maudslay Scholarships, to promote the study of the theory and practice of such branches of Engineering as the Trustees shall from time to time decide' In 1969, a Maudslay Scholarship tenable at Pembroke College, Cambridge, and administered jointly by the Society and the College, was established. At the fifth meeting of the new Trustees on 25 April 1972 (Minute 4), it was reported that the Department of Education and Science had accepted that a Maudslay Fellowship could be interpreted as a scholarship, the first Maudslay Fellow having been appointed in 1971.

1.2 Trustees

The Trustees of the Maudslay Scholarship Foundation (the Trust) are appointed in accordance with the Order dated 30 May 1967 made by the Secretary of State for Education and Science under section 18 of the Charities Act 1960. The Trustees during 2023, together with their appointing bodies, were as follows:

Mr R H Maudslay	Chairman	Nominated by the President of the Maudslay Society
Dr Roger Kinns	Treasurer	Nominated by the Vice-President of the Maudslay Society
Prof J M Maciejowski	Secretary	Fellow of Pembroke College, Cambridge
Lord Smith of Finsbury		Master of Pembroke College, Cambridge
Prof Richard Prager (to July 2023)		Head of the Cambridge University Engineering Dept
Prof Colm Durkan (after July 2023)		
Mr W A Osborn		Nominated by the Institution of Mechanical Engineers
Dr A K W Powell		Nominated by the Institution of Mechanical Engineers
Dr David Eaton		Nominated by the Newcomen Society
Prof David Perrett		Nominated by the Newcomen Society

1.3 Duties of Trustees

The duties of the Trustees are to:

- Decide from time to time the rules governing the award of the Maudslay Fellowship,
- Make arrangements for the selection of suitable candidates and
- Be responsible for the investment and safe-keeping of funds of the Maudslay Scholarship Foundation.

1.4 Powers of Investment

The Maudslay Scholarship Foundation is a registered charity (No. 313247) and powers of investment are determined by the terms of the Trustees Investments Act 1961.

1.5 Principal Address

The principal address of the Maudslay Scholarship Foundation (MSF) is: c/o Pembroke College Cambridge CB2 1RF.

1.6 The Maudslay-Butler Fellow

Income available from MSF assets has been insufficient to fund a college research fellowship in its entirety, without fallow years. Pembroke College therefore decided to use the Butler fund to complement income from the MSF until such time as available Butler funds were exhausted. This allowed surplus MSF income to

increase the endowment.

Dr Tom Chaffey was admitted to the Maudslay-Butler Fellowship in October 2022.

2 Treasurer's report for the year ending 31 December 2023

The MSF's annual income exceeded £25,000 for the first time during 2023, of which £15,000 was donated to Pembroke for continuation of the Maudslay-Butler fellowship. The income from equities and bonds alone was £23,867.

The total value of the Trust's assets, including cash, reached a new high of £517,020 at the end of the year, following the payment to Pembroke. Cash holdings were reduced, taking advantage of market weakness to purchase new investments.

Highlights are presented in the following sections, together with a forecast for 2024 and a summary of progress up to 3 June 2024.

2.1 Donations

Donations via the Maudslay Society were £10 from Mrs D E Maudslay-Cross, £40 from Dr J C D Hickson, £15 from Prof D Perrett, and £2 from Dr A K W Powell, all subject to Gift Aid. £60 from Dr R Kinns was used to pay the LEI fee. Mrs R Tripp gave £20 in memory of Mr W H Tripp, a former trustee. Personal gifts since the President's appeal in 2004 now total £126,017, including estimated Gift Aid recovery. A donation of £650 from the IMechE was received in 2023. The trustees are grateful for them all.

2.2 Assets

The value of MSF assets rose by 4.7% from £494,008 on 1 January 2023 to £517,020 on 31 December. Cash holdings were reduced from £21,941 to £15,595 during 2023, to allow purchase of new investments on market weakness. Net purchases of new investments, including use of surplus income after the payment to Pembroke College, totalled £16,364.

2.2.1 Equities

Long-standing direct holdings in M&G Charifund and COIF Income Fund are shown as separate items in Tables 1 (capital) and 3 (income). The holding in Schroder Income Investment Trust shown in Tables 1 and 3 is a combination of an initial direct holding and a subsequent nominee holding. The distribution of assets and their net cost is shown in Table 1. Net cost includes realised capital gains or losses on original purchases. A direct holding in ANZ Bank shares was gifted to the MSF by the late John Sampson in 2006. The original holding of 11,250 shares was reduced to the present 6,000 shares between 2007 and 2013 when the share price was historically high, in order to diversify MSF assets. This is reflected in the low net cost. Its Sterling value rose by 4.3% to £83,214 during 2023.

The Stocktrade account contains nominee holdings in various international investment trusts, bonds and equities, including some overseas holdings. Most UK holdings are in businesses that operate internationally. This account is operated on-line by the Treasurer after agreement with the Finance Committee about specific sales and purchases. Share purchases continued to be discussed and agreed by the Finance Committee before implementation by the Treasurer. Purchases in 2023 included increases in the holdings of Diageo, Ecofin Global Utilities (IT), Kenmare Resources, Legal & General, Rio Tinto, Sainsbury, Smith (D S) and Synthomer. New holdings in Serco, Dowlais (spun off from Melrose) were also acquired. Part of the holding in Rolls-Royce was sold to crystallise a capital gain.

Details of Investments Held on 31 December 2023
Excluding cash holdings

Investment	Units	Date of purchase	Net Cost	Unit price 31-Dec-23	Market value 31-Dec-23
M&G Charifund (Income)	4,730	1988 to 1999	£35,000	£14.35	£67,875
COIF Investment Fund (Income)	1,838	1999	£20,000	£19.85	£36,477
Schroder Income Growth Fund plc	14,657	2001 to 2016	£29,298	£2.80	£41,040
Shares and ITs in Stocktrade account (ex Schroder Inc Growth)		From 2007	£185,625		£249,327
ANZ Bank shares	6,000	2006, part sold between 2007 and 2013	£33,556	£13.87	£83,214
IS15 Ishares	0	From 2012 to 2018, sold in Aug-2023	£1,544		£0
I-L Government Stock	0	Various, now all sold	-£2,130		£0
2046, 0.875% Government Stock	44,000	Aug-2023	£20,378	£0.53	£23,492
Totals			£323,271		£501,425

ANZ shares valued at A\$24.50 ~ £10.00 on date of acquisition. Net cost includes capital return of £951 on 1-Sep-22

Table 1: Distribution of investment assets and net costs in 2023

2.2.2 Principal unit and investment trust holdings

The value of the holding of income units in M&G Charifund fell by 2.4% during 2023 to £67,875. The value of COIF Income Fund, which has principal holdings in US technology stocks, rose by 9.3 % to £36,477. Both are unit trusts. The combined value of the direct and nominee holdings in the Schroder Income Growth investment trust fell by 7.6% to £41,040.

2.2.3 Fixed interest

The holding of 200 shares in the IS15 exchange-traded corporate bond fund was sold in August 2023 and replaced by a holding of 2046 government stock, yielding 0.875%. It was then trading at less than half its face value, giving a yield of over 1.8 % on the purchase price and the potential for a large capital gain when interest rates fall or the maturity date is approached. Its value had increased by 15% on 31 December but is expected to be volatile in the immediate future. Payments of interest from the 2046 gilt are on 31 January and 31 July each year with maturity on 31 January 2046.

2.2.4 Cash

The CAFCash account is used as the principal current account for the MSF. It paid interest of £25 during 2023, offset by bank charges of £60 during the year. The cash balance was £5,088 at the end of the year. Cash

in the Stocktrade account, which paid no interest during 2023, was £5,366 at the end of 2023 and is immediately available for future investment. The COIF 'Fellowship Reserve' account was established to obtain some interest on funds that are destined for early payment to Pembroke College. Cash in this account was £5,171 at the end of 2023, increased by interest payments totalling £217 during 2023.

2.3 Payments to Pembroke College

There was another payment to Pembroke College of £15,000 during 2023. Table 2 shows the changes in value of investment excluding cash holdings, annual income from investments and payments to Pembroke from 1984 to 2023.

The Maudslay Scholarship Foundation						
Summary of Investments and Payments to Pembroke College since 1984						
<i>Cash holdings are excluded</i>						
Year	Cost (see note below)	Market Value	Increase in Market Value	Investment Income	Income from Assets	Payments to Pembroke
1984	£21,290	£23,823		£2,648	11.1%	£1,500
1985	£21,290	£23,790	-0.1%	£2,648	11.1%	£1,500
1986	£24,290	£27,139	14.1%	£2,813	10.4%	
1987	£25,699	£29,447	8.5%	£3,104	10.5%	
1988	£33,652	£35,895	21.9%	£2,807	7.8%	£2,000
1989	£33,652	£38,095	6.1%	£3,367	8.8%	£4,500
1990	£33,652	£35,188	-7.6%	£3,500	9.9%	
1991	£37,152	£38,086	8.2%	£3,364	8.8%	£5,000
1992	£37,852	£42,556	11.7%	£3,683	8.7%	£5,000
1993	£39,806	£50,421	18.5%	£3,098	6.1%	£5,000
1994	£44,806	£48,526	-3.8%	£3,325	6.9%	
1995	£44,806	£52,436	8.1%	£3,665	7.0%	£5,500
1996	£44,806	£54,192	3.3%	£3,748	6.9%	£5,500
1997	£42,666	£58,588	8.1%	£3,582	6.1%	
1998	£42,666	£62,127	6.0%	£3,648	5.9%	
1999	£51,666	£71,808	15.6%	£3,367	4.7%	£6,000
2000	£57,523	£80,658	12.3%	£3,773	4.7%	
2001	£61,423	£78,096	-3.2%	£3,999	5.1%	£8,000
2002	£61,103	£68,116	-12.8%	£4,332	6.4%	
2003	£61,103	£75,218	10.4%	£3,828	5.1%	£8,000
2004	£61,103	£81,824	8.8%	£3,856	4.7%	£8,000
2005	£61,103	£90,577	10.7%	£3,939	4.3%	
2006	£181,303	£240,862	165.9%	£10,056	4.2%	
2007	£187,327	£243,356	1.0%	£11,040	4.5%	£16,000
2008	£186,513	£163,483	-32.8%	£11,436	7.0%	
2009	£197,639	£236,044	44.4%	£10,721	4.5%	
2010	£212,693	£284,717	20.6%	£12,881	4.5%	
2011	£226,839	£276,747	-2.8%	£14,220	5.1%	
2012	£243,874	£332,287	20.1%	£15,433	4.6%	£12,000
2013	£250,764	£392,675	18.2%	£15,847	4.0%	£12,000
2014	£255,104	£392,011	-0.2%	£16,273	4.2%	£12,000
2015	£262,455	£369,679	-5.7%	£16,850	4.6%	
2016	£265,271	£432,012	16.9%	£17,745	4.1%	£15,000
2017	£267,052	£449,223	4.0%	£18,790	4.2%	£15,000
2018	£274,404	£397,200	-11.6%	£19,271	4.9%	£15,000
2019	£277,879	£452,786	14.0%	£20,488	4.5%	£15,000
2020	£282,031	£423,145	-6.5%	£14,087	3.3%	£15,000
2021	£286,748	£477,396	12.8%	£20,140	4.2%	
2022	£310,393	£472,067	-1.1%	£22,874	4.8%	£15,000
2023	£323,271	£501,425	6.2%	£23,867	4.8%	£15,000
Totals				£368,114		£222,500
<i>Cost of assets is the net cost, taking account of capital gains or losses on sales of shares and bonds.</i>						

Table 2: Summary of investment performance and payments to Pembroke College since 1984

2.4 Income

Total income including donations during 2023 was £25,018 after account fees, a rise of 9.8% from 2022. The distribution of income from investments is shown in Table 3.

Details of Income Received from Investments during 2023					
Excluding donations, cash holdings and account fees					
Investment	Income	Distribution in 2023			
	2023	Q1	Q2	Q3	Q4
M&G Charifund (Income)	£4,044	£615	£1,135	£970	£1,324
COIF Investment Fund (Income)	£1,001	£252	£249	£249	£252
Schroder Income Growth Fund plc	£2,023	£366	£366	£366	£923
Shares and ITs in Stocktrade account (ex Schroder Inc Growth)	£10,987	£3,200	£2,537	£2,634	£2,616
ANZ Bank shares	£5,551	£0	£2,601	£0	£2,950
IS15 Ishares	£261	£261	£0	£0	£0
Government Stock	£0	£0	£0	£0	£0
Totals	£23,867	£4,695	£6,889	£4,218	£8,065

Table 3: Income from investments during 2023

2.4.1 Donations and tax recovery

Donations in 2023 totalled £1,100 with previously deferred transfers from the Maudslay Society and from the IMechE. A donation of £650 from the IMechE was received in 2023, but the Institution has decided to discontinue this payment from 2024 onwards. Tax recovery (Gift Aid) from personal contributions was deferred until the claim has further increased in value. Claims every four years are acceptable to HMRC.

2.4.2 Income from equities other than long-term UT and IT holdings

Dividends from ANZ Bank shares were further increased in 2023. The total dividend payments in 2023 were £5,551 representing a yield of 6.2% based on the share price at the end of 2023. Dividends from other equities in the Stocktrade account, excluding the principal unit and investment trusts shown below, rose to £10,987. This is the actively managed part of the portfolio.

2.4.1 Income from long-term UT and IT holdings

There were no changes in the principal holdings in 2023, all changes being in the Stocktrade account. The income from COIF Income Fund, M&G Charifund and Schroder Income Growth Fund gave respective yields of 2.7%, 6.0% and 4.9%, based on unit prices at the end of the year. The total income from these unit and investment trusts rose from £6,859 during 2022 to £7,068 during 2023.

2.4.2 Interest on Cash Holdings

Interest on cash holdings totalled £242 in 2023.

2.4.3 Fixed interest

Income from the IS15 holding was £261 in 2023.

2.4.4 Charges

Charges for account maintenance totalled £200 in 2023. These were: £60 by CAF; £80 by Stocktrade, which is in addition to fees paid for share sales and purchases; £60 by the London Stock Exchange for maintenance of the Legal Entity Identifier (LEI). These charges reduced net income, except for fees paid on share purchases and sales which modify capital returns.

3 Forecast for 2024

3.1 Asset changes

There have been some sharp rises in equity prices as well as delays in reduction of interest rates in 2024. Several asset purchases in the Stocktrade account between 2021 and 2023 have led to significant capital gains as well as increased income in 2024. A recent announcement of a rights issue by National Grid has allowed purchase of a new holding at a favourable price in May 2024.

3.2 Income in 2024

Unit and investment trusts, as well as most individual companies owned by the Maudslay Scholarship Foundation appear likely to maintain or increase their dividends in 2024. Overall income should again exceed £25,000, despite reduced donations during the year.

4 Future payments to Pembroke

It is anticipated that £15,000 will be transferred to Pembroke in 2024. As in previous years, surplus cash will be used to increase the total asset value and future income for support of the Fellowship.

It is understood that the Butler fund will be exhausted in 2024 and that the Fellowship will then revert to its former title as The Maudslay Research Fellowship. However, the expected annual income from the MSF, which is now well over £20,000 and presently exceeds £25,000, will fall short of the overall funding requirement by the College and is dependent on market conditions.

4.1 The need for increased endowment or fallow years

Table 2 show the extent to which there have been fallow years from 1984 onwards. Some have arisen because fellows have resigned to take other posts, leading to delay in a new election. The ideal arrangement for the future would be a doubling of the endowment through a specific fund-raising campaign. Without the increased endowment, the Fellowship could only be offered at intervals that allow accumulation of MSF income. Partial further endowment would reduce the required number of fallow years. Further discussion with Pembroke College is needed to define funding requirements and alternative approaches.

Dr Roger Kinns
Treasurer of the Maudslay Scholarship Foundation

19 June 2024

Charity Commission: Independent Examiner's Report on the accounts

Report to the Trustees of the **Maudslay Scholarship Foundation Trust – Charity Number 313247**

On accounts for the year ended: 31st December 2023, set out on pages 4 to 10.

Respective responsibilities of trustees and examiner

The charity's trustees are responsible for the preparation of the accounts. The charity's trustees consider that an audit is not required for this year under section 144 of the Charities Act 2011 (the Charities Act) and that an independent examination is needed.

It is my responsibility to:

- examine the accounts under section 145 of the Charities Act,
- to follow the procedures laid down in the general Directions given by the Charity Commission (under section 145(5) (b) of the Charities Act, and
- to state whether particular matters have come to my attention.

Basis of independent examiner's report

My examination was carried out in accordance with general Directions given by the Charity Commission. An examination includes a review of the accounting records kept by the charity and a comparison of the accounts presented with those records. It also includes consideration of any unusual items or disclosures in the accounts, and seeking explanations from the trustees concerning any such matters. The procedures undertaken do not provide all the evidence that would be required in an audit, and consequently no opinion is given as to whether the accounts present a 'true and fair' view and the report is limited to those matters set out in the statement below.

Independent examiner's statement

In connection with my examination, no matter has come to my attention

1. which gives me reasonable cause to believe that in, any material respect, the requirements:
 - to keep accounting records in accordance with section 130 of the Charities Act; and
 - to prepare accounts which accord with the accounting records and comply with the accounting requirements of the Charities Act

have not been met; or
2. to which, in my opinion, attention should be drawn in order to enable a proper understanding of the accounts to be reached.



Signed: _____

Date:

Name: Catherine Rawlings

Relevant professional qualification: OECCA – DESCF

Address: Pembroke College, Trumpington Street, Cambridge CB2 1RF

Appendix: Research report from Dr Tom Chaffey (up to June 2023)

Tom Chaffey, Maudslay–Butler Research Fellow

1st June 2023

My research is in the development of scalable mathematical tools for the analysis and design of *neuromorphic circuits*: electrical circuits which behave like biological nervous systems. The promise of neuromorphic engineering is a computing paradigm which has the advantages of biological systems: low energy consumption, adaptability and attention mechanisms. The past several years have seen a surge of interest in neuromorphic engineering, with several high profile projects such as the European Human Brain project, Intel's Loihi and IBM's TrueNorth. However, we lack a scalable mathematical toolkit for analysing and designing large-scale neuromorphic circuits.

A neuron can be modelled as an active electronic component whose voltage drop spikes and bursts in response to input currents, a behaviour known as *excitability*. Such circuits can be modelled as passive devices in feedback with several positive and negative channels, and this allows tools from nonlinear feedback control theory to be applied to the analysis and design of such circuits. My research also draws upon tools from large-scale convex optimisation, classical circuit theory and machine learning. All these areas share common, but largely forgotten, origins, and much of my work involves revisiting these links in light of modern developments and new challenges.

The first six months of my fellowship at Pembroke have been wonderfully productive, and I feel as though I have made good progress towards understanding some things that have confused me for a long time.

Together with some colleagues at Lund University (Sweden), I have written an article for the European Control Conference showing that the driving-point behaviour of a circuit of nonlinear, two-terminal components admits precisely the structure for which the recent Condat–Vu~ optimisation algorithm has been developed. This allows state-of-the-art optimisation methods to be used to simulate oscillations in nonlinear circuits. We have been invited to submit an extended version of the article to a special issue of the European Journal of Control containing the best articles presented at the conference.

I have presented my work at invited seminars and workshops at the University of Groningen (The Netherlands), Technical University of Eindhoven (The Netherlands), Catholic University of Leuven (Belgium), and Technion (Israel).

A collaboration formed during my visit to Groningen has resulted in a submission to this year's IEEE Conference on Decision and Control, giving a novel characterisation of the energy storage of a particular class of electric circuits. This characterisation has, in turn, led to a definition of the excitability threshold of a neuron, which we believe to be the first generally applicable definition, and a good step towards the design of such neurons.

An outcome of my visit to Eindhoven is an ongoing collaboration with an engineer at ASML, a manufacturer of silicon wafer scanners. We are working on the design and verification of nonlinear integrators in high performance position control systems using Scaled Relative Graphs, a graphical design tool I worked on during my PhD, which generalises the Nyquist diagram to nonlinear operators.

I am currently working on a novel connection between classical circuit theory and recent methods in machine learning, about which I unfortunately have to be vague, due to a possible patent application.