William Edward Hearn on Knowledge-Based Growth: Innovator, or Plagiarist of John Rae?

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1 Introduction

Innovation: The action of innovating; the introduction of novelties; the alteration of what is established

Plagiarism: The action or practice of plagiarizing; the taking and using as one's own of the thoughts, writings, or inventions of another (*The Shorter Oxford English Dictionary*).

William Edward Hearn (1826-1888), sometimes dubbed as the first Australian economist,[1] has been alleged to plagiarize John Rae (1796-1872).[2] Charles W. Mixter, a modern discoverer of John Rae,[3] referred to the Hearn-Rae relationship rather cautiously:

> A careful study of John Stuart Mill's *Principles* reveals many undoubted instances of indebtedness. Indeed, on the side of pure economics it may be said that it was Rae, more than any other, who modified the Ricardian basis of Mill's thought. To an equal extent, perhaps, is Hearn in his *Plutology* indebted to Rae. This is seen not so much in particular passages as in the method and spirit of this admirable treatise. The high commendation which Jevons, Marshall, and Edgeworth have bestowed upon Hearn's work, therefore, belongs in part to another (Mixter 1905, xxxii).

La Nauze goes further than Mixter in pointing out Hearn's plagiarism:

> Hearn's use of Rae's book provides a curious example of the manner in which original works sometimes gain recognition. *Plutology* was generally praised for its treatment of production, where in fact it was drawing on Rae, in a manner which well illustrates Hearn's eclecticism. The derivative account of 'the effective desire of accumulation,' is associated with a conventional discussion of capital which neglects Rae's novel ideas… The prominent place given to Invention is clearly due to Rae and his language is echoed in various places; yet Hearn passes over Rae's lengthy philosophical discussion of the subject. Hearn recognizes and uses (*almost plagiarizes*) an original and neglected work; but there is a certain shallowness in his use of it (La Nauze 1949, 68; emphasis added).[4]

The alleged plagiarism has centred around two main innovations of John Rae's growth theory: the theory of capital and the theory of 'invention' (knowledge creation). As for capital theory, one might be able to make a valid case for Hearn's plagiarism of Rae; La Nauze compares Hearn's *Plutology* with Rae's *New Principles* word for word, concluding that 'in the chapter so praised by Edgeworth [Ch. IX of *Plutology*] he *plagiarizes* from John Rae to an extent remarkable even for him' (La Nauze 1949, 65; emphasis added).[5]

As for the latter, though La Nauze is no less critical of Hearn, his discussion is far less detailed, merely saying that Hearn 'neglects the most original and difficult parts of Rae's work in his discussion of capital; and the same is true of his discussion of Invention. The prominence given to Invention owes much to Rae, but the treatment is superficial. Rae has a long philosophical discussion of invention and the motives which impel men to invent' (La Nauze 1949, 71). If the allegation is true, what Plant (1934) calls the 'best theoretical discussion' of the relationship between scientific discovery and invention (Chapter XI 'Of the Circumstances which Determine the Extent of Invention') is after all not Hearn's.

Was William Edward Hearn (1826-1888) an innovator in his own right, or a plagiarist of John Rae? The main purpose of the paper is to investigate the issue with special attention to their theory of knowledge creation.[6]

I shall argue that Hearn did not plagiarize Rae, since Hearn's growth theory is different from Rae's. In order to understand their differences, the concept of knowledge-based growth needs to be elaborated. Two key elements of the knowledge-based growth perspective can be summarized as follows: (1) the crucial role attributed to knowledge in economic growth; (2) the economic analysis of knowledge creation with special reference to the benefits from, and costs of, knowledge creation.

Now two strands in the knowledge-based growth perspective are discernible in the history of economic thought, depending on how the knowledge creation mechanism is modelled: the first one stresses the cooperative nature of new knowledge creation, conceiving the process as consequent on cooperation with other factors of production and exchange, while the other emphasizes the competitive nature of new knowledge creation and costs associated with the public-good nature of knowledge. The major differences between Rae and Hearn emerge in three respects: 1) the speed of the adjustment process of the competitive mechanism; 2) the cooperative nature of knowledge; and 3) the role of government in knowledge-based growth. Though Hearn recognized the competitive aspect of new knowledge generation, he did not take it into account fully. On the other hand, John Rae built his growth theory on the public-good nature of knowledge combined with the competitive mechanism. As for policy implications, Hearn, along with Frédéric Bastiat, represented the view that the market mechanism was sufficient to sustain new knowledge generation, while John Rae argued that a judicious government intervention was often necessary to sustain the process.

The paper is organized as follows. Section 2 analyses Hearn's knowledge-based growth perspective compared with John Rae's.[7] Section 3 turns to the role of government in Hearn and Rae, a closely related topic. Section 4 recapitulates the arguments.

2 Knowledge-Based Growth

A Similarities

From the outset of *Plutology* (Chapter I 'Of Human Wants'), Hearn presented human beings as wants-satisfying agents who constantly desire an increase of physical comforts, feeling pains at their loss, ever desiring more physical comforts (15).[8]

This conception of wants-satisfying human beings is similar not only to that of John Rae,[9] but also to Frédéric Bastiat (1850/1996, 20-58). But Hearn further related this wants-satisfying activity to the growth of knowledge, in that the

growth of knowledge determines the diversity of wants: 'The number of wants that belong to this class is…limited…by our knowledge of the properties of matter or of material objects fitted to satisfy our wants, and by our skill in their adaptation. This knowledge and this skill continually increases; and as the limit they present recedes, the range of our tastes and of our artificial wants increases with them' (14-5). Also human beings' attempt to satisfy desires produces new desires, so the process is rather cumulative and autonomous once it is initiated (14).

Again like Rae, the importance of knowledge in the growth process is underscored in many places with a firm belief that the engine of growth is ever-increasing knowledge[10]:

> Man…may increase his control over nature by discovering new forces; or by applying improved methods to forces with which he is already familiar: but the principal source of his increased control is found in his own increased knowledge and increased industrial powers. This knowledge and these powers are constantly expanding; and men, consequently, are enabled to use natural agents of constantly increasing potency. Hence the course of human industry is from the worse to the better, and not otherwise. Our tendency is towards wealth, and not towards poverty; and the conditions on which the realization of that tendency depends, are our attentive study of nature and our fitting preparations to fulfil her requirements (8).

But did he develop a knowledge-based growth *theory*? It would be helpful to use classical growth theory as a reference point in order to understand the extent of Hearn's knowledge-based growth theory. Like classical writers, for Hearn production entails both natural agents and labour (26).[11] Corresponding to natural agents and labour, classical growth theory contains two essential components, diminishing returns to capital due to the land constraint, and the Malthusian population law.

As for the former,[12] Hearn distinguished between theoretical and empirical notions of diminishing returns, emphasizing that diminishing returns hold provided that agricultural technology remains constant: 'the existence of this principle [of diminishing returns] cannot be disputed; and we can to some extent trace its utility. But on the other hand, under this law man has sought out many inventions and the condition under which alone the law is true, namely, that agricultural skill remains constant, is never in fact fulfilled' (115-6). In reality, agricultural improvements act as the 'counteracting agencies to a constantly diminishing return' (110). A resultant increased return to land is explained by those agricultural improvements with no bounds; though it is theoretically possible for a time to come when all improvements cease, it is quite inconceivable for the time being (116).

Nevertheless, it is noteworthy that Hearn did not discard the law of diminishing returns as a theoretical concept. On the contrary, he even extended the law of diminishing returns to other natural agents beyond land: 'whatever may be its precise limitation, the law of diminishing returns cannot be held peculiar to land. There is no natural agent to which it does not in like manner apply' (117).

Turning to the population mechanism, the second component of classical growth theory, Hearn also accepted it, with several reservations. After stating the population mechanism for vegetables and animals, he did include human beings: they constantly try to increase at the geometrical ratio, though there is a certain limit to the rate of population growth (389).

There are, however, two major reservations on his part, one concerning the mode of check, the preventive check[13], the other concerning the possible induced creation of knowledge due to population pressure. As for the former, in the 'lower organisms the check is positive. It consists in the death from various causes of living beings that have naturally come into existence…While in the lower organisms the excess of their numbers dies, such an excess in the human species, or at least in the more advanced portion of it, is never born' (390).

More importantly, he conceived men as creating knowledge under the pressure of population, allowing mutual interdependence between the population mechanism and knowledge creation: economic growth produces population growth, which in turn is a precondition for economic growth:

> While the increase of population is thus limited, men are at the same time continually endeavouring to lighten the pressure of the check, by enabling an ever-increasing number of persons to comply with the requirements that prudence prescribes. If wealth bring with it population, population in its turn brings with it wealth. The most favourable circumstances for the exercise of all the industrial aids, but especially of co-operation and exchange, are found amidst a large population. It is only where a large population is assembled that combination of labour, on such a scale as the execution of great works of construction require, is possible (391-2).

Hutchison insists that Hearn was highly critical of the Malthusian generalization, along with Nassau Senior, Richard Jones, and Walter Bagehot (Hutchison 1953, 13).[14] Though Hearn was indeed critical of the details of the mechanism, it is quite misleading to suggest that he discarded it; he eventually admitted the validity of the population mechanism, the major reservation to the mechanism arising from the time needed for knowledge creation to counterbalance population pressure. For he stated quite clearly that 'however wealth may lighten it, the pressure still remains. Even in the most prosperous community the rate of increase never continues for any length of time unchecked. A large and wealthy society must be considerably developed. Development implies separate occupations. Separate occupations imply skill. Skill pre-supposes not only means and appliances but time' (393).

Rae was also critical of the population mechanism, though in the end he accepted it: 'the surface of the globe…is always abundantly replenished with animal and vegetable life, and the numbers of every race upon it are kept up to the quantity of materials fit for their subsistence which it affords them. The increase and decrease of the human species, follows the general law. This seems to be the foundation of what has been termed the doctrine of population' (Rae 1834/1964, 96).

In sum, Hearn's *Plutology* had two major components of classical growth theory which he shared with Rae. There is a striking similarity between the two economists in their explicit statement of assumptions regarding knowledge. But there is also a major difference regarding the population mechanism: Rae did not discuss the preventive check or new knowledge creation due to population pressure.[15]

Turning to knowledge creation in *Plutology*, Hearn, like Rae, discussed a wide variety of knowledge. First of all, he distinguished between invention, discovery and improvement. Drawing on the example of agriculture, he defined 'invention' as distinguished from either discovery or improvement: agricultural

implements are 'intended not to bring about new conditions of soil, nor to yield new products of any kind; but to do with more certainty and cheapness what had been done hitherto by employing the rude implements of former centuries' (171). As for the distinction between discovery and improvement, 'Great as has been the gain to production from discovery, still greater gain has been effected by improvement'. By 'improvement' Hearn meant 'not the discovery of natural agents previously unknown or unused; but the knowledge of new combinations, or of new applications, of agents already known' (99).

He also made a distinction between 'invention, imitation, and diffusion' (340), without distinguishing explicitly between what we now call invention and innovation. Thus, in his reference to the 'history of premature inventions' (197), the distinction is not clear, so that he seemed to think that they are the same.

On the other hand, science and 'art' (technology) are clearly distinguished, recognizing a possibility that technology lags behind the development of sciences (116). Related to the science-technology distinction is his recognition that 'The systematic knowledge of the relations which exist between the forces of nature is of late growth' (187). But 'The progress of science is now constantly and keenly watched for any practical advantage that it may afford to art; and every scientific discovery thus acquires almost immediately a commercial importance' (189), once again suggesting that 'invention' is intended for commercialization, and no explicit distinction is made between invention and innovation in the modern terminology. Science is now increasingly important for the continued creation of knowledge, since 'in all empirical arts, the limit of improvement is soon reached. The knowledge on which they depend is precarious; and is reliable only so far as the process and the materials are unchanged. It is only when the properties and the relations with which an art is concerned have been thoroughly investigated, and are accurately known, that that foresight can be obtained which leads to prompt and confident action. Science is the intermediate step between the empirical and the scientific state of art' (188).

The skill formation of the working population is also an important source of knowledge creation, education playing an important role in furthering skills.[16] This is clear in Chapter IV, 'Of the means by which the efficiency of labour is increased':

> The efficiency of labour, on whatever objects it is exercised, depends in the first instance upon the natural powers of the labourer; upon the skill that he has acquired in the particular occupation in which he is engaged; and upon his general intelligence. His skill is evidently the result of experience, whether obtained by himself or communicated by others; and his natural powers, both of body and of mind, are severally capable of receiving great additional strength and extension. The first means, therefore, of increasing the efficiency of labourer, is the education, in the largest sense of that term, of the labourer (53).

Another feature of knowledge is worth mentioning: Hearn, like Rae,[17] conceived the growth process of knowledge as a gradual one, primarily because human beings' intellectual ability is constrained so as to advance from one step to another gradually (103). As a consequence, inventions are not produced in a complete form, taking time to improve upon them: 'inventions are seldom produced in a complete state. They are generally the growth of time: they involve many partial, and many complete failures; and they are the subjects of continual improvement' (267).

B Differences

So was Hearn's knowledge-based growth theory, expounded mainly in Chapter XI, 'Of the Circumstances which Determine the Extent of Invention,' which Arnold Plant calls the 'best theoretical discussion' of the relationship between scientific discovery and invention (Plant 1934, 35; cf. Robbins 1967, 93)[18], a mere copy of Rae's? I shall argue that Hearn's argument is different from Rae's, in that he emphasizes different aspects of inventive activity.

He indeed recognized the costly nature of invention: 'Knowledge and practical skill can be acquired only by a great cost of time and trouble, and are consequently possessed but by few' (336). He warned against the popular presumption that new invention is easy. But 'the fact however is far otherwise': 'Invention depends upon conditions that are always more or less costly. This preliminary or incidental cost may exceed the return afforded by the power that it sets in motion. The invention thus ceases to be an aid to labour, and is consequently laid aside' (198).

On the other hand, he was clearly aware of the competitive process pressing down the returns to invention to a normal profit level. In Chapter XIX 'Of Competition,' he set out the general principle of equalization of price and the cost of production: 'In the social state…price tends towards the cost of production' (334). The driving force behind this principle is competition: 'In any community where competition prevails, the remuneration of all classes of services tends towards an equality' (335). The correction of 'extraordinary gain' to a normal one is mentioned in this connection:

> Whatever may have been the conduct which led to the reduced cost of production, other men quickly discover and imitate it; and the price from the competition of the new comers gradually falls, until the market price becomes that of the lower, not of the higher, cost of production. Thus competition secures both steadiness of price and uniformity of profit. The accidental advantages last so long only as their presence is necessary to excite imitation. When this object has been fully accomplished, equal efforts once more interchange (337).

Nevertheless, Hearn's analysis is not as the same as Rae's: he did discuss the costs associated with knowledge creation relative to the returns, but did not fully explore the implications, not taking into account the competitive mechanism.

On the other hand, Rae combined competitive pressure and the public-goods nature of knowledge, concluding that there is a suboptimal supply of knowledge from society's viewpoint.[19] Knowledge is a public good for Rae, since benefits diffuse to the members of the whole society (Rae 1934/1965, 259). Provided that new invention is costly, an inventor should be able to have 'extraordinary returns' (Rae 1934/1965, 51-2). Such extraordinary returns could not persist, though, because competition among inventors would reduce returns to the competitive level unless there was some entry barrier. Given that the technology introduced by the first inventor was immediately imitated by the latecomers, an inventor who is motivated by self-interest will never make the attempt. On the other hand, the potential social gain from this introduction could be large (Rae 1934/1965, 53). From this gap between the differential gain of society and that of the individual, Rae derived his central thesis that a judicious government should intervene to sustain knowledge generation.

The major difference between Rae and Hearn thus emerges in three respects; 1) the speed of the adjustment process of the competitive mechanism; 2) the cooperative nature of knowledge; and 3) the role of government in knowledge-based growth. I shall discuss the first two and leave the third to the next section. For Hearn, a motive for an inventor is identified as an economic gain, a premium, through the successful implementation of an invention: 'If one man…can reduce that quantity of labour, while with other men the amount of labour remains unchanged, he will gain the entire difference between his reduced cost of production and the ordinary cost. A strong motive for invention is thus supplied, and men are induced anxiously to search for the means by which the powers of nature may be forced to do the work previously performed by human muscles' (340).

Now imitators[20] will emerge to exploit this extraordinary profit, so that it will be pressed down:

> When such means are found, the inventor has a peculiar advantage which he can either use himself, or for the communication of which he can obtain from others a consideration. But such knowledge never remains long secret. The nature of the process becomes gradually known, and other persons begin to adopt it. As the number of these imitators increases, the price falls. At length the knowledge of the invention is generally diffused; competition reduces wages and profits to the ordinary level in other occupations, and the price returns to the cost, but now the diminished cost, of production. Through these three stages, invention, imitation, diffusion, to use the language of M. Bastiat, every process which substitutes inanimate forces for muscular action passes (340; emphasis added).

But he thought that the competitive process does not quickly eliminate all premia to the inventor:

> A premium, self-adjusted according to the merit, is given to the successful application of a knowledge of nature to the purposes of life. *Smaller but still ample rewards* are given to those who are the first to bring into general use these inventions. *These rewards gradually diminish as the service becomes less meritorious; but still continue to some extent until the final result of universal diffusion is secured*; and mankind obtain in the diminished sacrifices which their enjoyments demand the full and entire benefit' (340-1; emphasis added).

As for the former, Hearn thought inventors could benefit from their inventions even under competitive pressure, due to the gradual nature of that pressure.

More importantly, as his reference to Bastiat (1964, 38) in the above quoted passages suggests, Hearn's growth theory emphasizes a different aspect of knowledge creation. For him, 'invention' depends on several factors such as the state of science and technology, the skill and education of the workmen, and the amount of capital and leisure time available for the inventive activity. But it is cooperation, 'the concerted exertions of two or more persons' (216), that is more prominent than in Rae's theory.[21] In this respect, Chapter XVI 'Of the Reciprocal Influence of the Industrial Aids' is a theoretical high point of *Plutology*. Here he analyzed the interdependence between invention and cooperation: '*the progress of invention and the progress of co-operation are mutually dependent. The success of the invention depends upon the extent of the co-operation; the extent of the co-*

operation is limited by the power brought into action by the invention' (273; emphasis added).

On one hand, invention would affect cooperation, since an important invention would inevitably lead to a division of labour: the invention of steam-engine generated a variety of mechanical engineers, engine drivers, and other professions (273).

Hearn's favourite inventions facilitate communication, which would lead to further cooperation, leading further to invention (274). He explained examples of 'premature inventions' (197) from this interdependence perspective: the failure of inventions is due either to the 'difficulties of obtaining suitable co-operation, or from the expense or from the defective state of the arts involved in its working' (197).[22]

Also indicative is his fully acknowledged quotation from Rae's *New Principles*; he was more interested in Rae's discussion of the advantages of the division of labour than in that of invention: 'If a man possessed complete sets of tools for six different trades, five of these six sets must always be unemployed. There is therefore a clear gain, and that in the aggregate of no small amount, when each individual is enabled to limit his requirements to that single set of implements which he can keep in continual use' (278):

> The advantages of such a change to the whole community, and therefore to every individual in it are very great. In the first place the various implements being in constant employment yield a better return to what has been laid out in procuring them. In consequence their owners can afford to have them of better quality and more complete construction. The results of both events is that a larger provision is made for the future wants of the whole society' (Rae 1834/1965, 165; Hearn erred in locating the pagination as 164).[23]

It follows from this cooperative perspective that the role of demand is highlighted in determining invention, the expansion of wants creating a demand for invention:

> The influence of exchange upon invention arises mainly from the extension which the latter agency gives to wants. One of the most powerful influences upon invention is demand; and demand is as it were collected and concentrated by exchange. Individual desires, like individual efforts, are insufficient to induce the extended use of so costly an auxiliary as invention. But the combination of desires, like the combination of efforts, produces marvellous results (286; also cf. 193).

As is summarized nicely, both the costs and benefits associated with invention should be taken into account. Provided that invention is costly, Hearn thought that there has to be a strong demand for it to provide a sufficient incentive for an inventor.

His peculiar view on the population mechanism, according to which a large population size offers the opportunity of co-operation and specialization, which in turn is conducive to an increase of production per head, is a corollary of his cooperative view of knowledge-based growth: 'It is only in a large population that a perfect organization of labour can be effected; or that the facilities for exchange can be complete. It is only in such circumstances as these that large accumulations of capital are made; or that *inventions* can be executed and *rewarded*' (392; emphasis added). No doubt his vision of organic growth,[24] presented concisely in Chapter XXI, 'Of the Industrial Evolution of Society,' is

rooted in the interdependence perspective: 'The inter-dependence of the parts of any organism is a portion of its evolution' (402), and the analogy is extended to social organization, emphasizing the role of cooperation and exchange in the social system. (403). It is this cooperative and evolutionary perspective of knowledge-based growth that Hearn mainly focused on.[25]

3 The Role of Government

This section turns to the role of government in *Plutology*. Hearn was believed to be an adamant proponent of limited government, whose role is restricted to basic functions, while Rae was an enlightened interventionist. Hearn's general principle of non-intervention might be a mystery, in that 'curiously enough he does not seem to have been greatly influenced by the environment in which he was writing' (Copland 1935, 24). Also, in an excellent examination of Hearn's policy proposals in other works along with *Plutology* and in practice, Foster (1971) finds a contradiction between Hearn's theoretical work and his practical policy proposals such as government construction of railways and assisted immigration, though 'each policy he expounded which contradicted his laissez-faire outlook was proposed in such a way that the contradiction was minimal' (Foster 1971, 38). However, we shall argue that this 'contradiction' is to be understood as an inherent tension in his knowledge-based growth perspective, according to which new knowledge creation entails both costs and benefits. Though Hearn discussed the issue of government in other works, we shall concentrate on his *Plutology*.

In *Plutology*, the role of government is generally limited to the basic function of preserving law and order. The existence of law is essential for a society. For Hearn, economist and legal scholar, 'the maintenance of rights is the primary duty of government' (409). Therefore, though he admitted cases in which private enterprises are not able to or willing to perform without the support of the state, via some special power or privilege, 'these cases do not really involve any departure from the usual functions of the state' (421). For Hearn the 'usual functions of the state' always meant the preservation of laws, and giving privilege to private enterprises in the aforementioned case is justified on the grounds of preserving the general laws (421).

He further elaborated on the meaning of 'security or protection', which is the security or protection of *rights*, denoting the 'claims of each member of the state to the unimpeded exercise of all his faculties, subject only to the similar claims of those amongst whom he lives' (411). The maintenance of rights entails the state not only affording security both to person and to property, but also determining the definition of property, regulating the formation of contracts between the parties, and determining relations which have been left indeterminate by the parties (411-2). The preservation of law and order and the establishment of rights are very important as the foundations of market exchange, since 'Contracts are the very life of co-operation and of exchange' (412).[26]

His belief in government non-intervention was further confirmed historically (435), to the effect that government intervention had restricted 'the natural course of social evolution' (437), with Australia providing an ample example of the state exercising 'improper functions': 'In Australia the natural course of settlement has been disturbed by the action of the government in selling or withholding from sale at its discretion waste lands' (111).[27]

As for his specific policy proposals, his advocacy of free trade, among others, is most prominent. He insisted on free internal trade because he believed that it promotes exchange, which leads to cooperation and invention. As for external trade, the same argument applies (311).

However, as Foster (1971, 34) notes, even in *Plutology* Hearn suggested a possible case for government intervention, which can be understood in terms of his cooperative view of knowledge-based growth. Invention requires the aid of capital and the cooperation of other agencies (268). A case in point is the construction of roads, a prime means of communication which requires a great amount of capital: 'They are most potent instruments, and in their full development produce very remarkable results; but they are expensive instruments'. In this case, 'A deficiency might in some cases be experienced, since they require a greater capital and a greater amount of co-operation than infant societies usually possess. In such cases the interference of government, if judiciously applied, may accelerate and assist the ordinary processes of natural development' (380).[28] Though he concluded that 'Unfortunately the judgement shown in this interference is seldom very sound,' since 'Roads are often made either in a direction different from that in which they are really wanted, or on a scale unsuited to the requirements of the traffic' (380), there certainly exists a tension between his general principle of non-interference and his case for interference.

This tension should not be taken as a contradiction, since in principle Hearn could have supported government intervention when a particular intervention would be beneficial to the whole community. More importantly, his discussion of policy is to be understood in terms of his knowledge-based growth perspective: new knowledge creation entails both benefits and costs. It is quite logical that Hearn, believing in the benefits of knowledge gained through exchange and cooperation, tended towards free trade rather than interference; but when the costs of knowledge creation seemed to be important, as in the case of the construction of roads, he tended towards some form of interference. The same tension is discernable in Rae's policy proposals. He was quite famous for his call for protectionist measures, yet, upon a close scrutiny, it turns out that he was very cautious in arguing for them.[29]

4 Conclusion

This paper has argued that the allegation that Hearn plagiarized Rae is unfounded. There are indeed several similarities between Hearn and Rae in their growth theories: they both started from the basic premise of human beings as wants-satisfying agents; and they both constructed a knowledge-based growth theory with an insistence on the assumptions regarding knowledge.

However, Hearn's growth theory is different from Rae's in many important respects. They emphasized different aspects of the knowledge creation process, Hearn elaborating on the cooperative aspect, Rae focusing rather on the competitive aspect. Most importantly, as for policy implications, they differed markedly. William Edward Hearn was a free trader who believed that exchange facilitated by free trade would induce new knowledge creation, as opposed to John Rae, an enlightened interventionist who believed that judicious government intervention would be beneficial to new knowledge creation. Probably it is this non-interference view which separates Hearn from Rae, thus making Hearn an 'innovator' in his knowledge-based growth.[30]

Though I have argued that Hearn did not plagiarize Rae, since Hearn's growth theory is different from Rae's in important respects, especially on the role of government, this does not necessarily imply that Hearn was a true innovator. As far as the quality of Hearn's *Plutology* compared to Rae's *New Principles* is concerned, the former is rather loose in several important respects. Above all, Hearn did not analyze the factor returns movement along the knowledge-based growth path. Though his discussion of the competitive mechanism pressing down wage and profit rates to an ordinary level suggests that both move above the ordinary level in the growth process driven by invention, he did not spell out the secular movement.[31] On the other hand, Rae's discussion of the factor returns movement is clear-cut regarding, at least, the profit rate.[32] In this sense, Schumpeter's (1954) remark that 'The book [*Plutology*] has failed to impress me greatly' (826n2) is in part justified.[33]

Moreover, there is another possible plagiarism: he might have plagiarized Babbage and Bastiat. Though it seems more than probable that Hearn used Babbage and Bastiat as selectively as he used Rae, a further investigation is required to settle the issue.[34]

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Notes

[1] This is the title of Copland (1935). Understandably, Hearn described himself as a 'Briton' in his *Plutology* (1863, 7). Cf. Treloar and Pullen (1998, 18n2).

[2] The Scottish-born John Rae wrote his major economic treatise, *Statement of Some New Principles on the Subject of Political Economy*, (hereafter abbreviated as *New Principles*) in 1834 while he was living in Canada.

[3] At the turn of the century, he revitalized interest in John Rae by his paper (Mixter 1897), which sparked a controversy with Böhm-Bawerk (Böhm-Bawerk 1900; Mixter 1902), and by his rearranged version of Rae's *New Principles* (Mixter 1905), a very controversial decision.

[4] La Nauze also questions Hearn's originality in another context, pointing out Hearn's 'intellectual debt' to Mountifort Longfield's *Lectures on Political Economy* (1834) regarding the theory of value, though he does not suggest plagiarism on Hearn's part in relation to Longfield (La Nauze 1941, 256-8). Hutchison argues in a similar vein: 'Hearn's book is noteworthy for the primary emphasis it lays on the demand side, for its strenuously optimistic biological analogies (later indulged in by Marshall), and some very able chapters on Capital and Production. These latter are not, however, as original as has sometimes been thought. Hearn had read widely, including the valuable and original works of Longfield and John Rae, which were then largely neglected in Britain, and he summarized and quoted them extensively (particularly Rae), not always with

fully adequate acknowledgement' (Hutchison 1953, 64n1). However, Moss denies Hearn's indebtedness to Longfield altogether (Moss 1976, 115-20). Curiously, neither of Goodwin's books (Goodwin 1961, 1969) deals with the Rae-Hearn relationship.

[5] The following is the list La Nauze compiles:

(i) the inducement to accumulate capital is the hope of future advantage: Hearn, pp.149; Rae , p.53.

(ii) the difficulty of distinctly realizing the future: Hearn, pp.149-50; Rae, p.53-55.

(iii) the improvidence of barbarous tribes: Hearn, pp.150-52; Rae, pp.66-74. Hearn has nearly two pages of close summary of Rae on this point, followed by a direct quotation which he acknowledges.

(iv) the importance of 'the social and sympathetic feeling': Hearn, p.152; Rae, p.57 (Rae used the term 'the social and benevolent affections').

(v) the importance of security of enjoyment, with illustrations drawn from soldiers and sailors, and inhabitants of the West Indies: Hearn, p.161; Rae, p.57.

(vi) the importance of law, order, and security in society: Hearn, pp.162-3; Rae, pp.57-58.

It should be noted that La Nauze uses Mixter's edition of Rae's *New Principles*.

[6] This paper does not attempt to evaluate the economics of Hearn as a whole; nor does it attempt to evaluate his *Plutology* in its entirety. For more comprehensive evaluations of Hearn's economics, see Copland (1935); La Nauze (1949, 45-97); White, (1987); Groenewegen and McFarlane (1990, 51-56). His other major works (Hearn 1867, 1878, 1883) are not discussed, though it is quite misleading to treat them as unrelated to his economics. He was a distinguished legal scholar; A.V. Dicey regarded Hearn's work (1867) very highly, along with Bagehot's *English Constitution*. Cf. Alfred Marshall's letter to Foxwell, Whitaker (1996, II, 183). Groenewegen and McFarlane (1990, especially 53-54) argue for 'a more substantial role for evolutionist theory in Hearn's work' in its entirety.

[7] For John Rae's knowledge-based growth theory, see Wakatabe (1998). For a different interpretation, see Brewer (1998) and Rymes (1998).

[8] Unless otherwise noted, the number in parenthesis denotes the pagination of Hearn's *Plutology*.

[9] According to Rae, what distinguishes man from other animals is his 'provident forethought,' 'the capacity for perceiving, and retaining in his mind, the course of events and the connexion of one with another, that leads man to perceive what advancing futurity is to bring forth, and enables him to provide for its wants' (Rae 1834/1964, 81).

[10] The so-called Baconian influence might be pointed out as a philosophical background of the knowledge-growth perspective. Hearn's *Plutology* refers frequently not only to Francis Bacon (e.g., 4, 11), but also to Charles Babbage and William Whewell (188), both well known for their Baconianism. Another possible source of influence is August Comte's *Positive Philosophy* (9). As for Rae, his Baconianism is pervasive throughout the *New Principles*, in which he criticizes Smith for failing to adopt the 'Philosophy of Induction,' the true scientific method for him.

[11] With some exceptions: 'There are some natural agents which, in the ordinary sense of the term, need no labour…In some favoured parts of the earth, the bounty of nature is so profuse as, even with regard to man's proper wants, to dispense almost, if not altogether, with the necessity for exertion…But those cases are exceptional; and the wants thus supplied are merely man's primary needs' (26).

[12] On Hearn's earlier analysis of rent (Hearn 1851b), see Gordon 1967. As far as we can see from Gordon's summary, Hearn did not make the assumption of knowledge being held constant explicit at this stage.

[13] On Hearn's possible influence on Marshall on the population mechanism, cf. Groenewegen (1995, 485).

[14] The list is extended to include *New Ideas on Population* (1826), written by Alexander Hill Everett, a well-known Boston protectionist who presumably supported the publication of Rae's *New Principles*.

[15] In fact, Alexander Hill Everett criticized Rae's *New Principles* precisely because Rae did not treat the linkage between the population pressure and knowledge creation. Cf. Everett (1835).

[16] Education works for both economic and moral reasons: 'all training, even that which is purely physical, involves some moral discipline…The religious and moral influence of public schools appears to be much greater than their intellectual influence' (55). But what makes education primarily important is its economic effect:

> The most decisive proof of the importance of this training, at least in the aspect in which we are now considering it, is what may be termed its commercial value… Masters who have been at the expense of schools on high religious and social grounds, concur in saying that success is great on economical grounds. They find the readiness with which a well-educated man comprehends instructions, the willingness and the intelligence with which he makes trial of unaccustomed processes, and the quickness with which he learns them, the accuracy with which he notes the facts that come under his observation and the facility with which he reports them, the suggestions for the improvement of his business that he is able to offer, the diminished amount of superintendence that he requires, and the saving of waste from untrustworthiness, from blundering, from misconduct, and from misdirected labour, are advantages which the mercantile mind is not slow to appreciate (56-7).

[17] Rae conceived economic growth as a continuous and gradual process. To illustrate, consider Rae's example at the beginning of the *New Principles*: 'The wealth of England is certainly ten times now what it was in the reign of Henry the VIII' (Rae 1965, 18). From the age of King Henry VIII (1509-47) to 1834 almost three centuries had passed, amounting to a rate of growth of approximately 0.76 percent per annum, which is not so impressive. Rae himself noted that the change in the economy was so small that it would usually not be recognized: 'When…we come to consider the smaller parts of which this increase is gradually made up, as the change here is not perhaps perceptible, and as all we see is the sum produced by it, the fact of the increase being more easily ascertained than the manner of it, the similarity of the terms naturally inclines us to conceive that it resembles the increase of individual capital, and consists *of* a mere increase of things, not of a change *in* them' (Rae 1965, 19). Therefore, what he meant here by 'change' was a small change which could be discovered only by careful observation.

[18] Plant probably came to know Hearn through Jevons's work, since he grouped Hearn and Jevons together in one place (1934, 35). Ironically Hearn did not discuss patents, though the focus of Plant (1934) is patents. Hearn's lack of discussion of patents is a mystery.

[19] See Wakatabe (1998, 339-41). Also cf. Brewer (1998), Rymes (1998).

[20] Rae thought that 'man is essentially imitative; his instincts impel him to amalgamate with the mass' (Rae 1934/1965, 209). Similarly Hearn stated, in elaborating the social nature of human wants, that 'Man is imitative; and so seeks to have what his neighbor enjoys' (Hearn 1863, 17).

[21] Interestingly enough, Chapter XI on the determinants of invention is immediately followed by Chapter XII on cooperation.

[22] Therefore it is no wonder that Hearn emphasized cooperation as a stimulus to invention, criticizing Smith's 'third advantage' of the division of labour: while Adam Smith identified the division of labour as a direct cause of new invention, for Hearn it is 'a consequence of the increase of skill that co-operation brings with it' (278).

[23] Despite his familiarity with Babbage (1832/1989, 125), he did not refer to what is called the 'Babbage principle,' which identifies as the main advantage of the division of labour 'the more efficient distribution of labour, by classing the workpeople according to their capacity' (Mill 1965, II, 128). On the contributions of Charles Babbage, see Wakatabe (2000) and the literature cited there.

[24] On Hearn's evolutionary thinking, cf. Goodwin (1966, especially 325-280. On Victorian evolutionary social thinking in general, see Burrow (1966). The Hearn-Marshall relationship in this respect is quite well known in the literature. See Groenewegen (1988) and (1995). Nakano also suggests Hearn's possible influence on Marshall regarding the 'vision' of organic growth (Nakano 1991, 76-80).

[25] A Bastiat-like harmonic vision of society is another corollary of his cooperative view: 'in those countries which are confessedly the foremost in civilization, the effects of a benefit or of an injury done to one class are rapidly felt throughout the whole community. The insolvency of the capitalist throws the labourer out of employment. The prosperity of the labourer brings with it an increased demand for the use of capital and increased profits. When times are good, rent is well paid. When rents are well paid, there is a fresh stimulus given to profits and to wages. The bankruptcy of even one great firm sometimes, as we know, involves in its fall numerous distant, and in appearance even unconnected, establishments' (385).

[26] Hearn did not discuss patents, the most obvious knowledge-promoting arrangement, in *Plutology*. Despite his narrow conception of the functions of the government, in principle he could have supported patents since they establish property rights over inventions.

[27] In his earlier work, he attributed the causes of the underdevelopment of Ireland to legal impediments and the resultant high transaction costs: 'the great duty of Government is to preserve order at home and peace abroad, to secure the just performance of all contracts between man and man; and to leave to the powerful motive of individual interest to determine what those arrangements may be which best suit the circumstances and disposition of each. Beyond this, as a general principle, no government is justified in interfering, unless to remove with discretion the result of the undue interference of their predecessors' (1851a, 6).

[28] On Hearn's role in advocating the building of railroads, see Foster (1971, 34-35).

[29] For a more comprehensive examination of Rae's policy proposals, see Wakatabe (1999).

[30] La Nauze points out that Hearn 'fails to see that it [Rae's work] requires revision of some of the prevailing doctrines which he continues to accept, or at least a discussion of Rae's differing views. And, typically, he fails to indicate that a writer upon whom he draws heavily argues elsewhere against free trade' (La Nauze, 1949, 68). I am grateful to a referee for bringing this passage to my attention.

[31] Copland even questions the consistency of Hearn's distribution theory: 'his brief discussion of the theory of population was scarcely consistent with his treatment of wages and distribution in general' (Copland 1935, 38).

[32] See Wakatabe (1998, 341-44). Rae was less clear on the secular movements of the wage rate and rent.

[33] On the other hand, Schumpeter praises Rae's *New Principles* very highly, comparing it to Smith's *Wealth of Nations*: 'We must see in his work another *Wealth of Nations* or, more correctly, something that with ten additional years of quiet work,

graced by an adequate income, could have grown into another—and more profound—*Wealth of Nations*' (Schumpeter 1954, 468). Hicks did not even bother to mention Hearn's name in his well-known piece on the distinction between 'Plutology' (the theory of wealth) and 'catallactics' (the theory of exchange), since he believed that 'the only writer who has preciously used that term [Plutology] …was not of great importance; his ghost will forgive us' (Hicks 1976, 215).

[34] As for Babbage, despite several important contributions to the economic analysis of invention, he did not develop a macroeconomic growth theory. Cf. Wakatabe (2000).

References

Babbage, Charles (1832) *On the Economy of Machinery and Manufactures*, First edition, London: Charles Knight. Reprinted in *The Works of Charles Babbage*, edited by Martin Campbell-Kelly, London: William Pickering, Vol.VIII.

Bastiat, Frédéric [1850](1996) *Economic Harmonies*, translated from the French by W. Hayden Boyers, Irvington-on-Hudson: The Foundation for Economic Education.

Bastiat, Frédéric [1845-48](1964) *Economic Sophism*, translated from the French and edited by Arthur Goddard, Irvington-on-Hudson: The Foundation for Economic Education.

Böhm-Bawerk, Eugen von [1900](1959) *Capital and Interest, vol.1: History and Critique of Interest Theories*, translated from the German by George E. Hancke and Hans F. Sennholtz, South Holland, Ill: Libertarian Press. [Originally published in 1884; second edtion, 1900; third edition, 1914; fourth edition, 1921]

Brewer, Anthony (1998) 'Invention,' in Hamouda, Omar, Clive Lee and Douglas Mair (eds.) *The Economics of John Rae*, London and New York: Routledge, pp.129-43.

Burrow, J.W. (1966) *Evolution and Society: A Study in Victorian Social Theory*, Cambridge: Cambridge University Press.

Copland, Douglas Berry (1935) *W.E. Hearn: First Australian Economist*, Melbourne: Melbourne University Press.

E[dgeworth], F[rancis] Y[sidro] (1923) 'Hearn, William Edward,' in Henry Higgs (ed.), *Palgrave's Dictionary of Political Economy*, London: Macmillan, Vol.II, pp.294-5.

Everett, Alexander Hill (1826) *New Ideas on Population, with Remarks on the Theories of Godwin and Malthus*, Boston: Cummings, Hilliard and Company, first ed., 1823; second ed., 1826.

Everett, Alexander Hill (1835) 'Rae's Political Economy,' *North American Review*, Vol.40, January, pp.122-41.

Foster, George (1971) 'W.E. Hearn: A Laissez-Faire Economist in Parliament,' *Australian Economic Papers*, Vol.10, No.16, June, pp.25-39.

Goodwin, Craufurd D.W. (1961) *Canadian Economic Thought: The Political Economy of a Developing Nation 1814-1914*, Durham: Duke University Press.

Goodwin, Craufurd D.W. (1966) *Economic Enquiry in Australia*, Durham: Duke University Press.

Gordon, Barry J. (1967) 'W.E. Hearn on Rent: An Early Item,' *Australian Economic Papers*, Vol.6, No.8, June, pp.103-12.

Groenewegen, Peter (1988) 'Alfred Marshall and Australian Economics,' *HETSA Bulletin*, No.9, Winter, pp.1-15.

Groenewegen, Peter (1995) *A Soaring Eagle: Alfred Marshall 1842-1924*, Aldershot: Edward Elgar.

Groenewegen, Peter and Bruce McFarlane (1990) *A History of Australian Economic Thought*, London and New York: Routledge.

Hearn, William Edward (1851a) *The Cassell Prize Essay on the Condition of Ireland*, London and Dublin: John Cassell.

Hearn, William Edward (1851b) *On Cottier Rents*, Dublin: Hodges and Smith.

Hearn, William Edward (1863) *Plutology: or The Theory of The Efforts to Satisfy Human Wants*, Melbourne: George Robertson; London: Macmillan and Co [London edition is dated 1864].

Hearn, William Edward (1867) *The Government of England, its Structure and its Development*, Melbourne: Robertson; London: Longmans, Green & Co.

Hearn, William Edward (1878) *The Aryan Household, Its Structure and Its Development: An Introduction to Comparative Jurisprudence*, Melbourne: George Robertson; London: Longmans, Green & Co [London edition is dated 1879].

Hearn, William Edward (1883) *The Theory of Legal Duties and Rights: An Introduction to Analytical Jurisprudence*, Melbourne: John Ferres; London: Trübner and Co.

Hicks, J.R. (1976) 'Revolutions in Economics,' in Latsis, Spiro (ed.) *Method and Appraisal in Economics*, Cambridge: Cambridge University Press, pp.207-18.

Hutchison, T.W. (1953) *A Review of Economic Doctrines 1870-1929*, Oxford: Clarendon Press.

Jevons, William Stanley [1871](1970) *The Theory of Political Economy*, edited with an introduction by R.D. Collison Black, Harmondsworth: Penguin Books.

La Nauze, J.A. (1941) 'Two Notes on Hearn,' *Economic Record*, Vol.XVII, December, pp.255-8.

La Nauze, J.A. (1949) *Political Economy in Australia*, Melbourne: Melbourne University Press.

Longfield, Mountifort [1834](1971) *Lectures on Political Economy, delivered in Trinity and Michaelmas Terms, 1833*, Dublin: R. Milliken and Son. Reprinted by Augustus M. Kelley.

Marshall, Alfred (1961) *Principles of Economics*, ninth and variorum edition, with annotations by C.W. Guillebaud. London: Macmillan for the Royal Economic Society.

Mill, John Stuart [1848](1965) *Principles of Political Economy*, First edition. Reprinted in *The Collected Works of John Stuart Mill*, Toronto and Buffalo: University of Toronto Press, Vols.II-III.

Mixter, Charles W. (1897) 'A Forerunner of Böhm-Bawerk,' *Quarterly Journal of Economics*, Vol.11, pp.161-90.

Mixter, Charles W. (1902) 'Böhm-Bawerk on Rae,' *Quarterly Journal of Economics*, Vol.16, pp.385-411.

Moss, Laurence S. (1976) *Mountifort Longfield: Ireland's First Professor of Political Economy*, Ottawa, Ill: Green Hill.

Nakano, Satoko (1991) 'A. Marshall's Attitude Toward Utilitarianism and Utility Theory,' *Mita Journal of Economics*, Vol.84, No.1, April, pp.64-80 (in Japanese).

Plant, Arnold (1934) 'The Economic Theory Concerning Patents for Inventions,' *Economica*, N.S., Vol.1, pp.30-51.

Rae, John [1834](1965) *Statement of Some New Principles on the Subject of Political Economy, Exposing the Fallacies of the System of Free Trade, and of Some Other Doctrines Maintained in the Wealth of Nations,* Boston: Hilliard, Gray, and Co. Reprinted by Augustus M. Kelley.

Robbins, Lionel (1968) *The Theory of Economic Development in the History of Economic Thought*, London: Macmillan.

Rymes, Thomas K. (1998) 'Rae's Theory of Capital and Growth,' in Hamouda, Omar, Clive Lee and Douglas Mair (eds.) *The Economics of John Rae*, London and New York: Routledge, pp.144-56.

Schumpeter, Joseph A. (1954) *History of Economic Analysis*, New York and London: Oxford University Press.

Treloar, Alan and John Pullen (1998) 'Hearn's *Plutology* or Hearn's Olbology,' *History of Economics Review*, Vol.27, Winter, pp.16-20.

Wakatabe, Masazumi (1998) 'The Creation of Wealth: John Rae's Knowledge-Based Growth Theory,' *Journal of the History of Economic Thought*, Vol.20, No.3, September, pp.329-47.

Wakatabe, Masazumi (1999) 'The Operations of the Legislator: The Role of Government in Knowledge-Based Growth,' Mimeo.

Wakatabe, Masazumi (2000) 'Beyond the Canonical Growth Model: Knowledge and Learning in Classical Economics, 1815-1834,' in Forget, Evelyn and Sandra Peart (eds) *Reflections on the Classical Canon in Economics: Essays in Honor of Samuel Hollander*, London and New York: Routledge, pp.75-124.

Whitaker, John K. (ed.) (1996) *The Correspondence of Alfred Marshall, Economist*, three volumes, Cambridge: Cambridge University Press.

White, Michael (1987) 'Hearn, William Edward,' in *The New Palgrave: A Dictionary of Political Economy*, London: Macmillan, Vol.2, p.617.