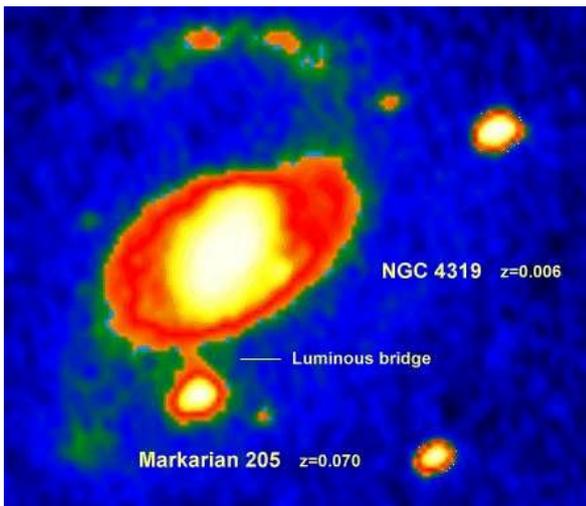


Current Controversies
The Arp Controversy Revisited
Concerning the Morphology of Galactic Evolution

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Unpublished Review of
Halton Arp Catalogue of Discordant Redshift Associations 2003, Apeiron, Quebec



Galaxy NGC4319 photo by David Strange

Seldom can so much theory have hinged upon an observation.

Halton Arp's new book, reviewed here by N Kollerstrom, features a paradigm-shattering colour photo of this galaxy plus quasar.

The photograph was taken by David Strange, a Dorset amateur astronomer, clearly showing (*figure opposite*) the 'luminous bridge' between them .

Does this picture reveal the secret of the universe, that galaxies bud to form quasars of higher redshift?

A recent *Astronomy & Astrophysics* report, based on observations at La Palma, has endorsed the notion that a galaxy (NGC 7603) and its nearby companion of very different redshift, are physically linked: it is its authors found 'the most impressive case of a system of anomalous redshifts discovered so far' ¹. As early as 1971 Fred Hoyle described this galaxy plus companion as 'The case where it is hardest to deny the evidence' ² - and the evidence here concerns what one might call a 'forbidden link,' impossible within modern cosmology: then in 1983 Hoyle alluded to 'the manifest fact that NGC 7603 is connected to its satellite' ³ ' Is this indeed a manifest fact, or is it a mere error in perception as modern cosmology would have it? Do the new observational data comprise a crucial experiment, and if so what implications would there be? For an answer this we turn to the theories and the new book of Mr Halton Arp.

If one views the form of a spiral galaxy, it can appear more as having unfolded out from a centre, rather than having condensed inwards from homogeneous matter in space. That antithesis does quite well express the contrast between Arp's views, and current cosmological theories. We have become conditioned to the idea of black holes at galactic centres, as a logical consequence and end-result of the Big Bang. Let's try instead to envisage Arp's view, of galactic centres as white holes, from which the matter of galaxies has emerged. Creation, out of nothing?

A long-term study of galactic morphology, using at times the most powerful telescopes available, over four decades, has lead Arp to his beyond-the-pale conclusion, that galaxies bud, fission, and grow in ways they are definitely not supposed to do. Much of his book *Seeing Red* was an account of how his papers have been rejected or marginalized - and, not one single astronomy journal reviewed it! Galaxies grow, Arp theorises, from quasars. Arp argues that, repeatedly, *filaments are seen to connect quasars with their parent galaxies*. That is the crux of his argument. Far from being the gigantic entities they are cracked up to be, out on the very edge of the universe, quasars are generally ejected in equal and

opposite pairs along the galactic axis, the hub of its rotation. They have their high-redshifts *because they are newly-formed*. That's the shock! The great error of 20th century cosmology, claims Arp, was to infer an immense distance because of their very high redshift. There are too many instances of their appearing adjacent to galaxies in equal and opposite pairs on either side of the galaxy, and with visible connecting filaments. This is especially the case for galaxies having high-energy centres (called, 'Seyfert' galaxies): these tend to have quasar-pairs ejected along or somewhere near to their rotation axis.

Arp presents a wealth of data indicating that redshifts vary both between galaxies and within stars of our own galaxy in ways that cannot really be interpreted as recessional velocity - as Hubble proposed in 1930. This book argues against the Big Bang, by undermining the Hubble logic which 'sees' the universe as expanding. Personally, I have always found that the notion of an expanding universe, with recessional velocity proportional to distance from us, but with no centre to this expansion, to be a thing which causes rational logic to disintegrate. Admittedly, one may well feel that this sort of behaviour of budding and ejection, is more appropriate for small things in a fishpond, than for galaxies in the depths of space.

Let's have some quotes from Mr Arp on the matter. Concerning the mid-twentieth century discovery that radio sources were being ejected from galaxies in pairs with filaments connecting them: "This fundamentally changed our view of galaxies: rather than vast, placid aggregates of majestically orbiting stars, dust and gas, it became clear that their centres were the sites of enormous, variable outpourings of energy ⁴. Some of the radio sources turned out to be quasars: "... The quasars are at much higher redshift than the galaxies from which they originate ... The redshifts, which are very high as the newly created matter emerges from its zero-mass state, continue to diminish as the mass of the matter grows ⁵." Arp has argued that redshifts are *quantised*, ie appear in discrete increments, rather than being continuous as one would predict if they expressed recessional velocity.

The startling part of Arp's cosmology has to be matter-creation at galactic centres: "A further advantage of this white hole scheme is that the new matter is created at the very centre of mass concentrations where the spin axis represents the direction of least resistance and can channel it out in opposite directions ... the new matter must initially emerge with the speed of light because, being at zero mass, it is essentially an energy wave and travelling at signal velocity. It will slow down as it gains mass as calculated by Narlikar and Das.." ⁶.

The 'cosmic background radiation' was discovered in 1965 and widely hyped as decisive evidence of the Big Bang, a sort of tone left over from that distant singularity. I never quite experienced the force of this argument, so was quite relieved to find Mr Arp explaining that, "In the non-expanding universe an obvious and much simpler explanation for the CBR is that we are simply seeing the temperature of the underlying extragalactic medium." He commented that its "extraordinary smoothness ... seems to me to be a very strong argument for a non-expanding universe."

Back in 1911 it was discovered that bright, blue stars had higher redshifts. As an undergraduate, Arp corresponded with the discoverer of this effect (W.Campbell) as to whether it could imply that such blue stars (in our galaxy) were streaming away from us, but clearly that was unfeasible. His explanation is that the blue stars tend to be younger and therefore have the greater redshifts. Thus he arrived at his heretical concept of "intrinsic redshifts in stars."

Two galaxies were found apparently in the act of merging (NGC2775 and NGC2777), which Arp views in reverse, as a galaxy caught in the act of budding! The younger one was almost totally devoid of metal-indicating spectral lines, "marking the galaxy as so young that successive generations of stellar evolution have not had time to enrich the metal content ⁷." This pair of galaxies, whether merging or budding, offered "a powerful example of a companion with a higher redshift than its parent." One cannot have one of the galaxies at a greater distance to account for their redshifts, because the two galaxies are manifestly interacting. "The companion even has an umbilical cord, a streamer of neutral hydrogen (H1) leading back toward the larger galaxy." Against the notion that these two galaxies are merging, Arp

argues reasonably that "The H1 from NGC2777 leads directly back towards the center of NGC 2775, implying the companion originated directly from that nucleus. Two galaxies falling together would have some transverse component of velocity and, therefore, not fall directly together but have a parabolic encounter." He added, "Companions around a main galaxy would have to orbit for the order of 15 billion years and only fall in for an encounter."

Paradigm Shift?

It was always unlikely that quasars should be thousands of times brighter than any previously known extragalactic source - it was a hint that the axioms had gone wildly wrong. The topic offers a fascinating study of how observation and theory are intertwined. For decades, astronomers have refused to 'see' a close proximity of quasars to parent galaxies. I suggest that the astronomical community is facing a paradigm-shift, as Thomas Kuhn described years ago in his classic *The Structure of Scientific Revolutions*, whereby a definition gets to be widened. At present astronomers are 'guarding' the simple identity redshift=distance which is the Hubble paradigm, and 'beyond the pale' cosmologists like Hoyle, Burbidge and Arp have wanted to assign to redshift also a second meaning, one alarmingly different in terms of traditional concepts. The question revolves around what we wish to permit matter to do. I suggest that if and when the switchover occurs it will permit us for the first time to have a real experience of how galaxies form.

Two generations of astronomers have now been probing the 'edge' of the universe under the impression that redshift must indicate distance. Much academic prestige is invested in this concept, in terms of viewing time on the world's most powerful telescopes. It may be time for astronomers to take a step back, and review the axioms which they wish to rely upon. For example, is 90% of the universe 'missing?' Cosmologists continue not to find this 'dark matter', and may eventually wish to consider Arp's view that this is a spurious problem resulting from scale-factor errors, generated by illusory redshift-inferred distances (p.188). on Arp's view the Andromeda galaxy has a blue-shift (a negative red-shift) because it is older than our Milky Way (p69). A more usual view would be that the Andromeda nebula is hurtling towards us, for no known reason, and so appears with a 'doppler' blue-shift.

Seeing Red Arp's master-work has many reviews up on the web, but they have all been printed in alternative-type journals, none astronomy. It is written in a personal and passionate style and its author is respected by his opponents as having been in the thick of the 20th-century cosmological debate. The UK Government department 'PIPARC' brackets subatomic physics and astronomy under the same aegis, and Cambridge's Institute of Astronomy and the Cavendish 'particle-physics' Laboratory face each other across the Madingley Road: one suspects that further debates are going to be required between these departments, as and when Mr Arp's theories start to be taken seriously.

Hoyle's View

Hoyle always supported Arp - as Dr Jane Gregory, who is composing a biography of Fred Hoyle, explained to me. Jane works in the same department as me (the STS Dept at UCL) and told me how she had an interview with Sir Fred before he died: he kept showing her images of the filaments linking galaxies to adjacent quasars). This was clearly expressed in his 1983 *The Quasar Controversy Resolved* as well as in his last (posthumous) book co-authored with the eminent cosmologists Burbidge and Narlikar: *A Different Approach to Cosmology: From a static Universe through the Big Bang towards Reality*. Hoyle coined the term 'Big Bang' in 1950, in a derisive and skeptical sense, and his last title politely informs the reader of its erroneous nature. Through this book Arp is cast as the heroic pioneer, e.g. concerning how astronomers terminated his profession of astronomy in America in the early 1980s: 'Thus, Arp was the subject of one of the most clear-cut and successful attempts in modern times to block research which it was felt, correctly, would be revolutionary in its impact if it were to be adopted⁸¹'. The authors endorses Arp's argument, e.g.: 'It is clear that over the past 20 years a great deal of evidence

has been found which shows that many QSOs [quasi-stellar objects = quasars] with large redshifts are physically associated with galaxies having much smaller redshifts⁹. The closure of his US career was surely beneficial, inasmuch as it resulted in Arp moving to Berlin's Max Planck Astrophysics Institute, with its new, X-ray telescope. He could re-examine objects he had earlier viewed through an optical telescope at the X-ray wavelength, as revealed their most energetic parts.

Recent controversy

A NASA website put up a Hubble image of the NGC 4319 galaxy and the quasar 'Merkarian 205' that Arp (and Hoyle) had claimed were connected by a filament, but its image seemed to show them as quite separate. "An overwhelming abundance of evidence long ago convinced virtually all astronomers that quasars are indeed at the vast distances indicated by their redshifts" it explained¹⁰. Why, how reassuring, to hear that 'virtually all astronomers' agree on this fundamental issue. In fact a billion light-years separated the apparently conjoined objects, the NASA site explained. Concurrently, an article in the MNRAS dismissed Arp's concept of redshift quantisation.¹¹ Does this mean that Arp's views are now yesterday's news? A rebuttal of these charges swiftly appeared in *Science*¹² with comments by astronomer Geoffrey Burbidge describing the MNRAS article as "a real piece of dishonesty." It alluded to the NASA website of the Hubble image and showed a picture in colour, indicating a filament connection between the quasar and galaxy. Burbidge's reply in the MNRAS soon followed¹³. Seldom can so much theory have hinged upon an observation. Arp's book features a paradigm-shattering colour photo of this galaxy plus quasar, taken by a Dorset amateur astronomer, clearly showing (See Figure) the 'luminous bridge' between them¹⁴. Does this [picture](#) reveal the secret of the universe, that galaxies bud to form quasars of higher redshift?

The above-mentioned Spanish paper described the luminous filaments connecting NGC 7603 and its 'daughter' companion and in addition discerned that two small objects in the luminous bridge have much higher redshifts than either of the objects which it connects. There is a long tradition in science of the notion of a 'crucial experiment,' around which debate is supposed to hinge, and it is hard to see how an observation could get much more crucial than this one.

Books by Halton Arp:

Seeing Red: Redshifts, Cosmology and Academic Science Quebec, 1998. *Catalogue of Discordant Redshift Associations* Quebec. 2003. Update: <http://www.electric-cosmos.org/arp.htm>

Footnotes

1 M.Lopez-Corredoira & C.Gutierrez, A&A 2002 390, L15-18

2 Hoyle, F., J.V.Narlikar, 'On the Nature of Mass' *Nature* 1971 233, 41-44, 41

3 Hoyle, F. *The Quasar Controversy Resolved*, 1983, Cardiff, p.26

4 Arp, Halton *Seeing Red* Apeiron Montreal 1998 p.4

5 Ibid, p.7

6 Ibid, p.231

7 Ibid, p103

8 F.Hoyle, G.Burbidge & J.Narlikar, *A Different Approach to Cosmology From a Static Universe through the Big Bang towards reality*. CUP 2000, p.134.

9 Ibid. p.140

10 <http://heritage.stsci.edu/2002/23/table.html>

11 Hawkins E. et. al., *MNRAS* 2002 336 L13-L16. 12 G.Schilling, 'New Results reawaken quasar Distance Dispute' *Science* 2002 298, 11 Oct., p.345

13 W.Napier & G.Burbidge, *MNRAS* 2003, 342, 601-604

14 Taken by amateur astronomer David Strange with a 50 cm. Telescope in Dorset at Worth Hill Observatory: www.dstrange.freemove.co.uk; Arp, *Catalogue of discordant Redshift observations*, Apeiron, Montreal p.227.