

GLOBAL ENDOLOGIES: INSECTS, SEMIOTICS, AND THE 'SYNERGIC AGE' IN OLD HISTORY

I

In November 1944, Decca Records released the album *Ell Fitzgerald and the Ink Spots*, the works of the 'I'm M' King Believe' and 'I, E. H. L. S. me in Mus F'l', seven weeks on the Billboard charts. The *Sing* album, featuring the 'Firs Lady, S'g' and the *bled red, r'du er Mil Gbler*. A very beautiful music miles, the *O. m. Sul Abdülme id I (1839-61)*, the *Hereke Im eri l C re M u ure*, the *el b, r e silk rugs* and his *D, lm b h, e l e*, the *Se, M rm r* these *ex r v - g r e s, m, g h e s e v e r w, v e*, the *ured be we e 3,000 d 4,000 k, s e r s q u e i h. Six de des e rlier*, the *19 O, ber 1781, Brig dier-Ge er l Ch rles O' H r*, his *Bri i M jes y's C, lds re m Gu rds d, ed his dis i i ve s rle - l, ured, e r's, s r, de, the b le eld y, rk, w, Virgi i, d surre dered he sw, rd, Lieu e - Ge er l Ch rles C, r w llis, M j, r-Ge er l Be j mi Li l, he N, r h Ameri C, i e l Army.*¹

A rich, more interesting series, might seem difficult, imagine these *e is, des sh re s- ishi g e ure, hey de e ded, the reme d, us r'du ive*

* h ks, Ni G, rd, S eve Gr y, H h Gree w ld, Ke K, r i i Li, Be j mi M dley, Jerry Melill, L lise Melill, Mi h el O' C, r, D w e ers, Kh ry lk, Eliz be h ry, r d, he, d, re ddel, w r heir i u, e rlier versi, s, his r i le.

¹ *S u r Ni h, ls, Ella Fitzgerald: A Biography of the First Lady of Jazz*, ed (New York, 1995), 81. *Emme Eil d, Oriental Rugs Today: A Guide to the Best New Carpets from the East*, 2 ed (Berkeley, 2003), 80; *r m, re, the Hereke Im eri l C re M u ure*, see *Ay, e F zly, dlu d Ok y Asl, The Last Loop of the Knot: Ottoman Palace Carpets (Istanbul, 2006)*. *O he di ere m eri ls used i dyei g, e r's, s d h, se, l, w e r - r ki g s, ldi e r i he Bri ish rmy*, see *S, Hughes Myerly, British Military Spectacle: From the Napoleonic Wars through the Crimea (Cambridge, Mass., 1996)*, 68.

Se d, he l, g- erm his ,ries , shell , silk d , hi e l
, er ,u er- rr ive , , ve i, l ,u s, m, der i y.
Duri g he i e ee h d we ie h e uries, i dus ri le gi -
eers hemi lly sy hesized d ggressively r, m, ed surr,-

e i e ly e gi eered d r, bly m ss- r, du ed. I er
d, mi ed by he r, mise, 'Be er Livi g hr, ough Chemis ry',
m y, rg isms sill, er e si imi ble l b, r, ries, me -
m, r h, sis. As resul, surgi g dem d, r shell, silk d
, hi e l, w, me d me hr, ough, u he w, rld, i ue,
relyu, i se se re i, s s me s, se uri g heir livelihoods
i ge, hi- e h gl, b liz i. ⁷

Gl, b l e vir, me l his, ry, ers, wer ul ly i l
r mew, rk, r rel i g hese i ers e ies ss, i i, s, l rger
s, i l de, l, gi lshi s. F, r mille i, e, le de, sys ems
i ge, gr hi lly dis i regi, s, he w, rld h ve i er ed i
r-re hi g w ys. he h lle ge, w i g r i i, ers,
gl, b l e vir, me l his, ry is, r s e d r, hes b sed
s, lely, l, l, r i, l, m ris, s d m, ve, w rds
m, dels h em h size r s i, l, e i, s. A m, re, m-
le e u ders di g, r, esses s diverse s he ex si, s d
, r i, s, im eri l k, wledge, he limi s, sy he i hem-
is ry, d he shi i g s e s, i ers e ies rel i, s requires
su h ex si, s, s, e ds le. Al h, ough his r i le ursues
comparisons m, g hree i se se re i, s, he em h sis here is
rim rily, connections — d he g, isms h hese
e, u ers ge er e — m, g r, du ers d, sumers r, ss
s e d ime. ⁸

⁷ 'Be er Livi g hr, ough Chemis ry' w s he sh, r e ed versi, , Du, 's gli e
'Be er, hi gs, r Be er Livi g... hr, ough Chemis ry', whi h he hemi l, m y

E vir, me lhis, ri s re ls, u iquely, si i, ed, revise
 ,ur u ders di g, he r, les h ,rg isms h ve l yed i ,ur
 ul ur l d e h ,l, gi l sys ems. I i versi, , Le, M rx's
 ,w- mili r me h, r, 'hem hi ei he g rde ', his, ri
 Edmu d ussell h s, e ded h he his, ry, bi, e h ,l, gy
 migh i s e d be see s he 'g rde i hem hi e', r hei er-
 l y, ev, lu i, d e h i l h ge, r, du e 'bi, l, gi l r i-
 s sh ed by hum s, serve hum e ds'.⁹ ye i se s re ,
 merely he reli s, hr, , ge i m i ul i, s. Bey, db, -
 i l d me h i l me h, rs lies re i i, , hew ysi
 whi h hese re ures h ve l ered— d, i ue, sh e— he
 r mew, rks, , ur exis e e.¹⁰ As his ri le, ludes, i se s
 re si egr l, he re li ies, , ur e r hly surviv l s hey h ve
 bee , , ur visi, s, , herw, rldly, , ly se.¹¹

Mille i, e vir, me l d i, s d ul ur l, m-
 m, d i, s h ve u derwri e hum rel i, shi s, i se s.
 ↘ hr, ough, u his, ry, hese i re id re ures h ve, ul ed
 , ur , lk les, , lli ed, ur fl, weri g l s d l gued, ur
 elds. ↘ hey h ve served s uli ry, r ers, es, eve s hey
 di ed, , ur r hi e ur l, u d i, s. Civiliz i, s h ve e red
 hem s ve , rs, dise se, revered hem s s red, bje s, d

throughout India his royal household used Ayurvedic
medicine, sweets, exiles, dyes, jewellery and
with his influence. In 1590, the emperor ordered
the Mughal Emperor Akbar to establish a royal

Between 1885 and 1899, Assam's average annual rainfall was 714,860 kilogr ms.²¹

Laws enacted by the British administration in 1908, the British Indian Government, and

Legislation in the agricultural, commercial, and irrigation departments redresses the economic conditions of the Indian people, who are hardly noticed by the hardy observer, the executive, the farmer, the musician, the agricultural district, the rivers, the islands, the

ssimil i, he rees whi h hei se eeds u, jus sh, ey d
beesw x re r, du ed by he m, di i, he e r, fl, wers by he
bee.²⁷

Eve he w, rd lacquer used misu ders di gs. Ni e ee h-
d we ie h- e ury Eur, e r is s used he erm whe
re erri g, shell, bu hey ls, em l, yed i whe dis ussi g
, her v r ishi g subs es, su h s he s, he Rhus vernici-
flua, ree e demi, Chi.²⁸

As he immedi e rede ess, r, m, uld ble l s i s, shell
u derwr, e v s rry, m eri l ul ures. I eigh ee h-
e ury New E gl d, r s e, le reque ly ur h sed he
r w re urs, r, shell, I di seedl, r use i bi e ry
d ur i ure ishi g.²⁹ Duri g he i e ee h e ury, shell
served s he m i i gredie i h, gr hi ses. I 1837 he
Fre hm L, uis-J ques-M dé D guerre i ve ed he rs
, mmer i lly su ess ul h, gr hi e h ique, he d guerre-
y e r, ess, whi h used silvered, er l e, r, du e
dire, si ive im ge i he mer, r, e r gile d guerre-
y e l es — d he ex ge er i, s, h, gr hs k, w s
mbr, y es d i y es — m u urers shi, ed 'u i,

Shell was hebi dig ge i , m , si e, whi h ls, i luded
 rushed limes , e, lubri s d br sives. Shell re , rds were
 resis , we r, bu e ured , rse gr, , ves h re ed r k-
 li g sur e , ise like b , sizzli gi ryi g . e , rd r,
 du i, dr, ve dem d. I 1920 l, e, he i ed S es
 im , r ed m, re h \$23 milli, w, r h , shell U r, m S, u h
 E s Asi .³¹

Be use , heir hysi l r, er ies, shell re , rds exhibi ed
 u usu l degree , embedded , bs, les e e. C, sim, M ss ,
 , u der , he r, li J&M e , rdi g Sudi, i New Orle s,
 re lled h i he 1940s ' hi re , rd w, uld ge w, r , u e h
 week , he juke b, x, be use shell su lies were s re d
 re , rd , r mul i, s were , , r... [A re , rd g, l yed 100/110
 imes d i w s w, r , u . S, hi re , rd ke , selli g d
 selli g'.³² F, r musi , m ies, his w s qui e wi d ll, bu
 duri g he Se , d , rld r, shell su lies , r ed dr s-
 i lly. J 's i v si, s , M l y , h il d, I d, hi d
 Burm disru ed gl, b l su lies , he v lu ble r, du , he
 U i ed S es r r, du i, B, rd beg r i, i g shell i
 A ril 1942 be use he subs ew s key ishi g m eri li
 b, d ir r r, du i, .³³

hese sh, r ges r, elled r s l i w r ime re y li g
 m, veme . I 1943 m ig e i led 'New e , rds De e d
 , y, u!' , s, r ium , re , rdi g , m ies e , ur ged
 , w ers , u w ed 78s , ur i heir shell dis s , r re r,
 essi g. e rese ives , De e , rds, C, lumbi d
 rl, h, e , u ed i Bri i 's Gramophone m g zi e:

Owi g , w r , di i, s he G, ver me h s , u di e ess ry , , -
 serve su lies , shell d , her m eri ls esse il , r m u uri g

³¹ A dre Mill rd, America On Record: A History of Recorded Sound, 2 d ed (New
 York, 2005), 202; im, hy D y, A Century of Recorded Music: Listening to Musical
 History (New H ve , 2000), 19. By 1900, shell re , rds h d re l ed e rlier w x
 yli ders d vul ized rubber dis s s he medium, h, i e, r musi l yb k. See
 Me r, V l, shi , he reserv i, d S, r ge, His , ri 178 r m e , rded Dis s',
 Music Reference Services Quarterly, viii (2002), 39; Mi h el Ch , Repeated Takes: A
 Short History of Recording and its Effects on Music (L, d , 1995), 29; he s i
 , mes r, m Ch mber, C, mmer e, he i ed S es, Ameri , Our World Trade
 in 1920: Value and Volume of Principal Exports and Im Im Im 1815(the)-199.7 (Am43.8(n5(the)912.6(had)-3

re, rds by he m, s s ri ge res ri i, s s, he use, hese m eri ls. A hes me ime he G, ver me h s re, g ised he v lue, he gr m, h, ere, rdi su, ri gm, r le, d he gre hel h i gives, he wre, r, e h ves red, e, r, m i i su lies, ver he l s hree ye rs, d his, we re sure, is well re, g ised by re, rd users, he ur her m i e e, dequ e re, rd su lies will de e d u, he g, d will dre di ess, he ubli, re ur, ld du w ed re, rds, be use, ly by his me s will m u ure, i ue.³⁴

By M y 1946, S shell ri es s, d \$45 er, , m, re h ri li g heir re-w r ver ge, \$14 er, .³⁵ he e d, he w r m rked he d w, ewer i re, rdi g e h, l, gy d he e d, shell 's h l- e ury reig, ver he re, rd i dus ry. I 1948, C, lumbi e, rds i r, du ed he 'M yli e' 45-r m, 7-i h ex e ded l y ('E '). Sh, r ly here- er, CA M, r, ll, wed sui wi h he 33½-r m, 12-i h l, g- l yi g ('L ') vi yl. New re, rds, re ed by sy hesizi g, lymer, vi yl hl, ride d vi yl e e, were h rder d er h h, se m de, shell, ll, wi g m u urers, ress m, re gr, ves i, he dis. Shell 78s, i ed r, u d 85 gr, ves eri h, while he ewer E s d L s ver ged be wee 224 d 260 gr, ves eri h, his i, v i, r s, rmed he lis e i g ex erie e by ex e di g l yi g ime, redu i g b k- gr, u d, ise d e h i g re, rd dur bili y, he 'hi- deli y' er h d begu .

Eve s, he seve y-ye r, mmer i l exis e e, he shell dis h d bee eri, d, u re ede ed l, gevi y, r musi l e h, l, gy. Fr, m heir dve i he 1890s, heir ul im e demise i 1962, whe EMI Musi wi hdrew i s l s rem i i g 78s r, m i s l, gues, shell re, rds lled he lle i, s, musi lis ers w, rldwide, he musi e h, l, gies h h ve, l- l, wed — vi yl re, rds, reel- , -reel udi, eigh - r k re, rdi gs,

³⁴ Gramophone (Feb. 1943), 16. I he e rly 1940s, he 'Big, hree' re, rd, m - ies — CA M, r, C, lumbi d De — m u ured m, s, he re, rds m de i he SA. See, im, hy D, wd, 'Fr, m 78s, M 3s, he Embedded Im e h, l, gy i he M rke, r rere, rded Musi ', i J, se h L m el et al. (eds.), The Business of Culture: Strategic Perspectives on Entertainment and Media (M hw h, NJ, 2006), 208.

³⁵ Kur z Myers, 'Curre e, r, he e, rd i dus ry', Notes, 2 d ser., iii (1946), 413. Fr ex m les, r, r e-led re y li g m ig s duri gw r ime, see Ke e h D. Durr, he "New I dus ri l hil, s, hy": S. C, r, r e e y li gi, rld r IP, Progress in Industrial Ecology, 20 De . 2006.

esse es, m dis s, DA, s d M 3s—h ve e ded ,
 h ve mu h sh, r er , mmer i l lives.³⁶

III

SILK

Like he de iled , u s , shell 's e rly uses, ex e sive de-
 s ri i, s , re-m, der silk r, du i, h ve ir ul ed , r mil-
 le i . A , rdi g , C, u ius (c.551–479 BCE), i 2640 BCE,
 Em er, r Hu gdi's wi e Leizu w s re ri g e whe silk-
 w, rm , , , umbled i , her u r, m , verh gi g mul-
 berry ree, he hre d h she shed , u s re hed he le g h ,
 her g rde . eg rdless , his h rmi g e d, e's ver i y, by
 he Sh g Dy s y (c.1600–1040 BCE), s, his i ed silk r, du -
 i, (seri ul ure) w s yieldi g eleg ex iles.³⁷

Seri ul ure , i ues , i v, lve m y , he s me e h iques
 e ured i i s e rly his , ry, hese i lude l i g mulberry
 rees, eedi g mulberry le ves , silkw, rms, , lle i g silkw, rm
 , , s, d he ex r i g he silk by 'reeli g' he , , s i

As raised in medieval China, silkworm cultivation, reared in the world's oldest models, intensive system. Developed by Guangdong's silk industry during the Ming Dynasty (1368–1644), the 'mulberry embroidery' system (

(can sang ju) hr,ugh,u Si hu r,vi e, r,vidi g rmers
wi h mulberry rees, l d d seri ul ure r i i g.⁴¹

Su h ,m mi me s , s e res,ur es dem, s r ed silk's u -
r lleled s di g s Asi 's m,s lu r ive ,mm,di y., he
,m s rs e ,u ered he shimmeri g i se se re i,
whe M r us Li i ius Cr ssus d his seve ,m legi, s su -
ered dev s i g de e by he r hi s heb le, C rrh e
(H rr i s,u h-e s er ,urkey) i 53 BCE. ,m r, s were
e ri ed whe r hi s d rd-be rers u urled gle mi g
s rle - ,l,ured silk b ers, embr,idered wi h g,lde hre ds.
, his s e le ,m ied he ,m s' i r,du i, , he
ersi ,m ,u d b,w, ,mmem,r edi lu r h's h rr,wi g
,u , he' r hi sh, ',wi h whi h gile m,u ed r hers
i ed he erri ed legi, ires , heir shields.⁴²

Des i e his r um i rs e ,u er, ie ,m s be me
,bsessed wi h silk. H,wever, while ,m ex e di ures ,
Chi ese silk were s r, ,mi l, heir k ,wledge , seri ul ure
rem i ed rudime ry. I his rs - e ury CE e y l, edi ,

graves, here was ... the silk, and surely he would
referred excellently, although he was ... well
time, they were ...⁴⁷

Brian's ... the silk, and surely he would
his ... the silk, and surely he would
referred excellently, although he was ... well
time, they were ...⁴⁸

Filed ... the silk, and surely he would
his ... the silk, and surely he would
referred excellently, although he was ... well
time, they were ...⁴⁹

Meanwhile, European ... the silk, and surely he would
his ... the silk, and surely he would
referred excellently, although he was ... well
time, they were ...⁵⁰

⁴⁷ John Smith, *Travels and Works of Captain John Smith: President of Virginia and Admiral of New England, 1580-1631*, ed. Edward Arber, 2 vols. (Edinburgh, 1910), i, 56.

⁴⁸ ... the silk, and surely he would

ry Hereke

ier i g-su ki gm, u h r s disrel ed , hids d i d s.
 he bug's ,ve ed red igme ,mes r,m he rmi i id
 (hr qui , e) se re ed i , he i r ellul r vesi les , he
 wi gless em le. N, l i serve s he h,s l s ,r hese
 i se s, d hus , hi e l r,du i, , urs i , lries, he
 em les h hemselves , he ds, ,r l d,des, , he i
 duse heirh, ll, w r, b, s ises , ex r m, is ure d u rie s
 r, m he l s. I he r, ess, hey exude s r ds, , , yw x
 , r, e heir b, dies d egg m sses r, m red ,rs d he
 eleme s. ri i gi 1653, he Jesui Ber bé C, b, des ribed he
 ull-gr, w em le , hi e l i se s, 'l gr dez de u gr -
 b z, ' rís, l' (he size , hi k e , r kid ey be).⁵⁷

I Mexi , w, re-C, lumbi d, mes i ed , l i, he
 'N, l de S G briel' (Opuntia tomentosa v r. hernandezii) d
 he 'N, l de C s ill ' (Opuntia ficus-indica), h, s ed , hi e l
 ul iv i, his r, ess yielded he desired grana fina, ,r e
 , hi e l, s he S ish lled he d, mes i ed i se 's se re-
 i, . Like seri ul ure, he r i e , r isi g , hi e l bugs de-
 m ded dev, i, , b, h i se s d h, s l s, he em le
 , hi e l bug is vir u lly de e eless be use , her fligh less ess
 s, ul iv ,rs s e m y h, urs e h d yw rdi g , red ,rs,
 whi h i luded wild , hi e l (cochinilla silvestre), he eler,
 w, rm (Laetillia coccidivora), hi ke s, urkeys, liz rds, w, d-
 e kers, mi e dr s.⁵⁸

I re r i, , r , hi e l r, du i, , l i required
 be wee w, d hree ye rs, m ur i, . Cul iv ,rs he buil
 ube-like es s, ,r husks ,r lm le ves, e h h, usi g sever l
 d, ze reg em le bugs. Me d w, me w, uld x hese
 , i ers , he , l l d, des. O e he i se s h d h hed
 dm ured ,r ,ur, r vem, hs, r, du ers w, uld h rves he
 bugs d dr, w , s e m ,r su -dry hem, hese r, esses

⁵⁷ h, m s Eis er et al., ' ed C, hi e l Dye (C rmi i A id): I s , lei N ure',
 Science, 30 M y 1980, 1039; Ber bé C, b, , Historia del Nuevo Mundo (1653), ed.
 M r , s Jimé ez de l Es d , 4 v, ls. (Sevillel-g, r ve(

su eri, r, ll, hesei erms, isvibr y d s ess. i hi
 hl - e ury er is rrv l i Eur, e duri g he 1520s,
 Mexi , hi e l h d , m le ely re l ed , lish , hi e l
 d kermes s he m, s widely used red dye. I 1599, he re-
 s e ed Mexi , Ci y reside G, z l, G´mez de Cerv es
 , ed h C s ili s were s e ger , r shi me s , grana fina
 s hey were , r rg, es , g, ld d silver.⁶⁴
 As wi h shell d silk, he , r i g i s d r, du i, r, esses ,
 , hi e l eluded im eri l , sumers, , hr, ugh, u he six ee h
 d seve ee h e uries, Eur, e wri ers dis u ed whe her
 he , ve ed rmi e dye derived r, m i se s, w, rms, berries , r
 l seeds. I r, he , usi, s emmed r, m he , mm,
 S ish me , r he dye-s, ur e, grana, whi h li er lly r sl es
 s ‘gr i’. I 1555, he E glish , bserver , ber , , ms,
 de l red, , he C, hi ill is , w, rme, , r flye, s s, me s y
 i is, bu berrie h gr, we h u , er i e bushes i he wilde

l,ser , h,me. I 1888, he E glish r veller Ch rles Edw rdes
highligh ed , e su h ve ure , he C ry Isl ds:

↪ he i se w s , i r,du edi ↪ e eri e u il1825; d ,r ime i
,uld , be e ,ur ged , r , g e su ess ully. A ries w s he dis-
,verer , he righ me h,d , ur ure, d ,him i is due h ,r,m 1845
, 1866 ⁶⁹ u l r , , r,m w , sixmilli , u ds , , hi e l w s
r,du ed.

↪ his r s l i r ser , , hi e l r,du i , ,i ided wi h
rev,lu i , i hemis ry. I 1858, illi m He ry erki ,
ssis , he Germ hemis Augus ilhelm v, H, m ,
i ve ed sy he i ur le igme ,k ,w s m uve,↪ he ,m-
,u d, r,du ed r,m , l r,w s he rs ili e dye. M í s
,mer, , Mexi ,s rs mb ss d,r , he u i ed S es, -
ured he

not one is an object of synthesis'.⁷¹ Less h w, de des er
 ilkes' de i ive s eme , Friedri h ŷhler sy hesized ure ,
 he i r, ge - , i i g subs e i m mm l uri e. As he
 y, u g Germ rese r her wr, e , his Swedish me , r J k, b
 Berzelius i 1828: 'I mus ell y, u h I re re ure wi h-
 , u requiri g kid ey, im l, ei her m , r d, g'.⁷² i h
 he r, du i, , sim le m, le ule, ŷhler sh ered he ime-
 h, , ured dis i i, be wee , rg i , m , u ds di , rg i
 subs es, he 'Sy he i Age' h d begu .

I he , ll, wi g e ury, his si i, wi h sy he i m er-
 i ls r ged r bey, d he , es, hel b, r , ry. I 1923, he
 r, he , high m, der is r hi e ure, Le C, r busier (Ch rles-
 Éd, u rd Je ere), , u ed, he rime , seque es, he
 i dus ri l ev, lu i, i "buildi g" sh, w hemselves i his rs
 s ge; he re l i g, ur l m eri ls by ri i l, es, , he -
 er, ge e, us d, d, ub ulm eri ls by h, m, ge e, us d ri i l
 , es (ried d r, ved i hel b, r , ry) d by r, du s, æd
 , m , si i, '.⁷³ Le C, r busier's h rd-edged u i, lism -
 v, ured sy he i m eri ls, whi h re l ed he r w, rker wi h
 he e gi eer d ili ed u re ede eds d rdiz i, ,
 desig ri i les.⁷⁴

he 1950s m rked he ex, sy he i hubris. I 1952, he
 j, ur l Science ublished ri le by he , rg i hemis , ger
 Ad ms lled 'M 's Sy he i Fu ure'. Ad ms, wh, he ded he
 iversi y , Illi , is Chemis ry De r me , r e rly hir y
 ye rs, redi ed he immi e demise , su h r, du s sw, l,
 , , silk dle her, , re si g heir re l eme wi h hem-
 i lly sy hesized , m , u ds. As he u i, 'I he u ure i ize s
 will m, re e e ively rm hel d d hese s; , b i e ess ry
 mi er ls r, m he , e s; l, he hemselves r, m , l d

⁷¹ J, h ilkes d J. Adl rd (eds.), *Encyclopaedia Londinensis: or, Universal Dictionary of Arts, Sciences, and Literature*, 24 v, ls. (L, d, , 1810–29), iv, 167 (em-
 h sis dded).

⁷² Friedri h ŷhler, *qu, edi Ber rd J e, Crucibles: The Story of Chemistry from Ancient Alchemy to Nuclear Fission*, 4 h rev. ed (New ŷ, rk, 1976), 131, he se resul s
 e redi Fr. ŷhler, 'eberkū s li he Bildu gdes H r s , s', *Annalen der Physik und Chemie*, lxxviii (1828).

⁷³ Le C, r busier, *Towards a New Architecture*, r s. Frederi k E hells (1927; New
 ŷ, rk, 1986), 232.

.il. . .'.⁷⁵ Su h r s ,r m i ,s w ,uld ,me ,ur esy , m ,der
 hemis ry. I he r ,v , ively i led b , ,k, The Road to Abun-
 dance (1953), hemis J ,b ,si d wri er M x E s m
 l imed, , he ime h s ,me whe he hemi l i dus ry
 d will, sl ,wly bu surely, ke ,ver r ,m gri ul ure he sk ,
 , ,d r ,du i ,'.⁷⁶ A ewye rsl er, s e i lre ,r re red ,r
 he i ed S es Se e F ,reig el i ,s C ,mmi ee , -
 urred, s i g, 'Sy he i s m y i he re s , bly e r u ure
 m ke he r ,du i , , ee, , , , , , , , sug r, w , , l d
 s ,me , her r m ,mm ,di ies u e ess ry'.⁷⁷
 , his i h i b ,u dless i dus ri l i y , su l he -
 ur l wi h he ri i l ex e ded , every ,r er , s , ie y. I
 1957, he hemi l ,m y M , s , , ll b ,r ed wi h he
 M ss huse s I s i ue , , e h , ,l ,gy , re e he 'H ,use ,
 he Fu ure', re bri ed ru i ,r m dwelli g , s ru ed
 e irely , sy he i ,m , e s (see l e), , we y milli , vis-
 i ,rs ,ured he 119-squ re-me re l si d bregl ss h ,me i
 Dis eyl d's , ,m ,rr ,wl d' exhibi i , , whi h r ,udly r , -
 l imed, 'i ,uld be s id h h rdly ur l m eri l , urs
 i i s ,r igi l s e ywhere i y ,ur ew h ,me!'.⁷⁸ Dis ey d
 M , s , - i ve ,rs , himeri l d hemi l u ures -
 j ,i ed ,r es , his qu si-m gi l usi , , symb ,li d li er l
 eleme s. As he li er ry he ,ris , l d B r hes r med his , l-
 lisi , , my h d m er: 'Des i e h vi g mes , Greek she -
 herds (,lys yre e, , lyvi yl, , lye hele e), l si . . . is i
 esse e he s u , l hem1435 , D[(he)-474.2(i e , r ed)-474.lys i l

lls b, u he d gers, hemi l ,llu i, .⁸⁵ By he l e 1980s, ur milli, sy he i hemi ls were i r, du i, hr, ough, u he SA, d six y h, us d h d e ered i, , mm, use.⁸⁶ evel^U i, s b, u he im li i, s, his s e, irs, r hum he l h beg, re eive wides re d e i, i N, r h Ameri, Eur, e d J. As he his, ri Li d N sh i s, u, 'Deb es, ver hemi ls d heir regul i, re, r, , deb es b, u he rel i, shi be wee b, dies d heir e vir, me s'.⁸⁷

he e sui g ul ur l b kl sh w s m, s re wi h he 1996 ubli i, , Our Stolen Future by gr, u, e vir, me - l he l h s e i lis s. Fe uri g, rew, rd by i ed S es Vi e reside ALG, re, he widely ir ul ed b, k^U sser ed h sy - he i, m, u ds were disru i ghum e d, ri e u i, s.⁸⁸ I he w, rds, he his, ri Mi helle Mur hy, his ew w, rld, rder m, u ed, 'hemi l regime, livi g', where 'm, le ul r rel i, s ex e d, u side, he, rg i re lm d re ei er - e i, s wi h l ds es, r, du i, , d, , sum i, , requiri gus, ie he his, ry, e h, s ie ewi h, li i le, - my', he dve, his er ls, m rked shi i he imes le, e vir, me l he l h issues. r, du s h bi, degr de, ver mil - le i le ve mul i - ge er i, lim ri, b, he, sys ems d he hum issues i whi h hey umul e.⁸⁹

⁸⁵ Firs h d es im, i ls b, u hese w, dis sers be u di L, is M rie Gibbs (s, ld, Murr y Levi e), Love Canal: My Story (Alb y, 1982); . . . Ch, uh, Bhopal: The Inside Story. Carbide Workers Speak out on the World's Worst Industrial Disaster (New Y, rk, 1994). F, r de ile d ssesme s, he he l h, se que es, L, ve C l d Bh, l, see Dwigh, . J eri h et al., 'C er I ide ei he L, ve C l re ', Science, 19 Ju e 1981; ush S. Meh et al., 'Bh, L, r gedy's He l h E e s: A eview, Me hyl Is, y e, , xi i y', Journal of the American Medical Association, 5 De . 1990.

⁸⁶ im, hy Mi hell, Rule of Experts: Egypt, Techno-Politics, Modernity (Berkeley, 2002), 21.

⁸⁷ Li d N sh, 'uri y d D ger: His, ri l effe i, s, he egul i, , E vir, me l ,llu s', Environmental History, xiii (2008), 651.

⁸⁸ he, C, lb, r, Di e Dum , ski d J, h eers, Myers, Our Stolen Future: Are We Threatening our Fertility, Intelligence, and Survival? A Scientific Detective Story (New Y, rk, 1996).

⁸⁹ Mi helle Mur hy, 'Chemi l egimes, Livi g', Environmental History, xiii (2008), 697. F, r m, re, his, see Devr D vis, The Secret History of the War on Cancer (New Y, rk, 2007); J, h rg, Our Children's Toxic Legacy: How Science and Law Fail to Protect Us from Pesticides, 2 d ed (New H ve, 1998).

VII

THE LIMITS OF SUBSIDIARIZATION

On the ideological, liminal growth require, respectively, digital, subsidiaries. In earlier, liberalism, emerged, growth, hierarchy, structure, industrialism. By employing 'growth', imperialism, is relied, as esbey, d'heir, w' terra firma, such as, es' d' reig' l' ds, 'su' leme' heir' h' rves' s' d' ugme' heir' res, ur' e' s' ks.⁹⁰ 'ye', i' he' ses', d' mes' i' ed' i' se' s', heir' highly' skilled' ul' iv' 'rs' d' heir' r' ri' ed' h' s' l' s', su' h' de' e' de' -' ies', e' r' ved' rus' r' ig' 'r' h' se' u' ively' i' h' rge. E' duri' g' mis', e' i' s' b' u' he' r' ess', shell' r' du' -' i' , 'iled' em' s' seri' ul' ure' i' 'l' 'il' se' leme' s', di' -' ul' ies' i' r' s' erri' g' he' , 'hi' e' l' bug' di' s' Opuntia' us' h' s' , 'erri' , ries' , u' side' L' i' Ameri' , 'd' he' resis' e' , d' mes' i' ed' i' se' ul' iv' i' , 'e' , 'mies' , s' le' flus' ered' Eur' , e' im' eri' lis' s' i' v' rie' y' , w' ys. O' e' rri' ed' , u' wi' h' s' riki' g' ig' , r' e' , l' , l' k' , w' ledge' , ' -d' , w' em' s' , i' dus' ri' lize' ure' hr' , ugh' r' di' l' sim' li' i' , s' , 'm' lex' e' , l' , gi' l' r' , ess' es' h' ve' r' , du' ed' li' y' , emb' rr' ssi' g' il' -' ures' d' u' mi' g' ed' di' s' s' ers' , ver' he' e' uries.⁹¹

The 'rom'ers, the 'Sy' he' i' Age' r' , mised' h' hel' b' , r' -' ry' w' , uld' r' , vide' 's' - 'l' , i' les' e' r' , m' su' h' , r' , -' i' , s' wi' h' he' 'limi' s' , gr' , w' h' . H' , wever' , i' umber' , ses' , he' subs' i' u' i' , ' sy' he' i' r' , du' s' , r' ur' l' , es' h' s' r' , ved' i' r' ble' r' , m' hes' d' , i' , ei' her' m' , le' ul' r' hem- is' ry' , r' e' , 'mi' e' ie' y' . Subs' es' s' v' ried' s' bl' , d' , rubber' d' v' ill' re' rem' rk' bly' resis' , re' l' eme' wi' h'

⁹⁰ Mi' hig' S' e' 'iversi' y' , d' s' ie' is' Ge' , rg' B' , rgs' r' , m' rs' devel' , ed' he' ' e' , 'gh' , s' re' ge' . See Ge' , rg' B' , rgs' r' , m' : see his *Hungry Planet: The Modern World at the Edge of Famine* (New York, 1965). 'illi' m' C' , ' ex' ed' B' , rgs' r' , m' 's' ' e' , ' h' , m' rry' i' g' ' i' y' ' i' lude' s' ' , ssil' re' ge' , r' ' im' , r' s' , e' ergy' r' , m' reh' is' , ri' s' , ur' es' . See 'illi' m' . C' , Jr. , *Overshoot: The Ecological Basis of Revolutionary Change* (Berkeley, 1980), 41. F' , r' dis' ussi' , s' b' u' he' , r' -' di' i' , s' h' rise' whe' subs' i' u' i' gl' b' , ur' d' i' l' , r' ur' l' res' , ur' es' , see

more varied versions.⁹² Silk is similarly imitable. As he writes, 'Biological materials, especially series which can be reproduced by artificial means. Silks, reproduced either by spiders or mulberry rearing, good examples of materials which are imitable'.⁹³

In the series, 'The Shell, many of the synthetic substitutes, these series are used, usually, by the industry, the Synthetic Age. In 1950, children in the United States became sick from eating dyed, or dyed with the synthetic, products of FD&C Orange No. 1 and FD&C Red No. 32. New York Congressman James J. Delaney subsequently organized hearings, hemi-litigates the industry's conduct. He called 'Delaney Use', which the Senate Congress passed in 1958, the same day as the Food, Drug, and Cosmetic Act. In 1938, the so-called 'Nondiscriminatory' bill was deemed, because it is a dual industry, where it is governed by market principles.

⁹² The biggest obstacle, synthesis of ribbons, is the high oxygen-rythm, global, by the industry, outside the re-ive, in the red blood cell. See Andre Mazzilli and Sebastian, Chemistry and Biochemistry of Oxygen Therapeutics: From Transfusion to Artificial Blood (Hoboken, 2011), xxiv; Jerry E. Squires, 'Artificial Blood', Science, 8 Feb. 2002. Likewise, many of the synthetic materials, the 'rubber tree' (Hevea brasiliensis), such as the yucca, are derived from vegetable, especially the synthetic materials.

“ur l” re d’.⁹⁶ hile Mexi rmers sill su ly rmi e , he gl, b lm rke , 85 er e , he w, rld’s , hi e l , w , mes r, m highl d eru, where is r, du i, i v, lves , ver 100,000 milies.⁹⁷

C, em , r ry seri ul ure sh res m y e ures wi h rese - d y shell d , hi e l r, du i, , he ex si, , hi - e h i dus ries h s used m y J ese d K, re i ize s , b d, silk w, rm ul iv i, , bu Chi , I di , h il d, Me m d Br zil h ver idly i re sed heir silk-r isi g, er - i, s i he s ew de des. Be use seri ul ure is h, me - b sed ivi y h res , ds well , mi r, e, i, ers u usu l , , r u i ies , relev i g he e , mi ds, i ls us, rur l w, me . Al h, ugh silk , m rises , ly 0.2 er e , he , l v, lume , ex il es r ded , he w, rld m rke , is , mmer i l v lue is sever l, rders , m g i ude gre er, , ly be use , i ss us s luxury g, d, bu ls, be use m y i, s r, du e rim rily , ri er l , sum i, . F, rex m le, I di silk we - vers sell 85 er e , heir r, du , d, mes i , sumers, mu h , i e di g u i w, me ’s s ris.⁹⁸

⁹⁶ J, sé S hul, ‘C rmi e’, i G briel J. L ur, d F. J k Fr is (eds.), *Natural Food Colorants: Science and Technology* (New Y, rk, 2000); , ld E. r, ls d d C heri e A. Culver, ‘Al er ives , h, se Ari i l FD&C F, d C, l, r s’, *Annual Review of Food Science and Technology*, iii (2012); J e Zh g, ‘Is, here Bug i y, ur Jui e? New F, d L bels Mi gh S y’, *Wall Street Journal*, 27 J . 2006, B1. I A r. 2012, S rbu ks swi hed r, m , hi e l , vege ble-b sed dye i i s s r wberry ‘Fr u i’, ll, wi g , sumer, u ry, ver he rese e, bugs i bever ges. See K ri Klei , ‘S rkb u ks Is Ge i g he Bugs Ou ’, *Los Angeles Times*, 23 A r. 2012. F, r ses , dverse he l h re i, s , , hi e l, see Ci dy Skrzy ki, ‘Allergy Fe rs, i ge Deb e , Bug-Dye ule’, *Washington Post*, 9 M y 2006, D1. O he ed Dye N, 3 b , see , ld H m, wy, *Government and Public Health in America* (Chel e h m, 2007), 188; i ld C, l, rs Fr, m N ure websi e, <h ://www.wildfl - v, rs. m/? ge= , hi e l rmi e> (essed 30 J u ry 2013).

⁹⁷ F, r eruvi , hi e l r, du i, , see , driguez d Niemeyer, ‘C, hi e l r, du i, ’, 78; Luiz C rl s , driguez d i s ul, L d Cle r e d S, i l C i l i M, u i Agr, -E, sys ems: , he C se , O u i S rubl di Ay u h, , eru’, *Ecological Economics*, xlix (2004), he C ry Isl ds h s ls, re - i vig, r ed is , hi e l r, du i, . See Desiree M ri r, ‘S ish Isl ds L u h C, hi e l C, meb K’, *Taipei Times*, 18 Se . 2011, 11.

⁹⁸ j K. D d M hesh N v y, *Global Silk Industry: A Complete Sourcebook* (B, , 2005), 10–11; G. S. Gee h d . I dir , ‘Silk w, rm eri g by ur l , me i K r k : A h , Em , werme ’, *Indian Journal of Gender Studies*, xviii (2011); B rb r Er h et al., ‘I e si i , egimes i Vll ge-B sed Silk r, du i, , N, r he s , h il d: B, s s (d Ch lle ges) , me ’s Au h, ri y’, i Ber de e . esurre i, d ebe Elmhirs (eds.), *Gender and Natural Resource Management: Livelihoods, Mobility and Interventions* (L, d , 2008); G. S dhy , i, Women in Sericulture Vietnam

me h ve ls, bee e r l, herevi liz i, I di l
r, du i. Give heir sys em i lly dis dv ged, si i, i
hel b, ur m rke d heir limi ed ess, i l, r w, me
i, u lyi g regi, s, e de e du, he lle i, -im-
ber, res r, du s (N, F s), su h sl. L -re ri gi v, lves s
m y s ve milli, e, le i I di, d N, F s, i ue,
r, vide u, 75 er e, rur lw, me r, ss he i, wi h
heir rim rys, ur e, i, me.⁹⁹

hr, ough mu h, he devel, i g w, rld, i se ul iv i,
h s l, g bee m i s y, e, mi lly m rgi lized sm ll-
h, lders. I he ses, Ell Fi zger ld's 78-r m re, rd, Sul
Abdülme id's silk r es d Sir Ch rles O'H r 's red, i -
se s d heir hum ul iv, rs r, du ed ur l, ile d
visu l gl, b liz i, s h se i m, i, r-re hi g rel i, shi s
r, ss, i e s, e s ds e ies b, u d ries. he i me
shell, silk d, hi e l, Eur, e si h bi ed knowledge
periphery, mys i ed by he rese e, i se se re i, si heir
mids bu de e de u, hel, lk wledge, highly skilled
w, rkers i dis e, sys ems.

Shell, silk d, hi e l re, l, ger he m eri ls h

VIII

A LOCAL SE O ME, AMO HOSIS?

Des i e he, m i rese e, i se si, urd ily lives, he m, der
 Eur, -Ameri i ude, w rds hese re ures ge er lly rem-
 m i s, e, revulsi, . I his re ise British Central Africa
 (1897), he b, is d, l, i l dmi is r, r Sir H rry
 J, h s, dmi ed, his 'swee i g h red, he i se r e'
 d rem rked, 'I is sur risi g, my hi ki g h, ur sylums
 re, m i ly lled wi he, m, l, gis s drive, dementia by he
 s udy, his h, rrible l ss'.¹⁰⁰ hir y- hree ye rsl er, he, u-
 l r N, r h Ameri s ie e ubli i, Modern Mechanix, l d
 re ders:

Aw, rld ruled by gi i se s, wi h hel s rem s, he hum r e s
 sl ves is, e, he v, ri e devi es, e s h, l, i, wri ers.
 F si? N, ll... All s his, ry i di es h whe, di, he
 rese iviliz i, mes, e d, i will die be use, u s, lved, d
 r, blem, d h i se s will be, ribui g, r, d he e m y be
 he surviv, rs.¹⁰¹

ye, i, v ive i versi, s, his s e ri, re r s, rmi g
 err, r i, err, ir. L, g r ised by i dige, us ul ures,
 e rly every, i e, e, m, h gy — he, sum i, i -
 se s — is g i i g urre y m, g u ri i, s ie is s s vi ble
 r, u e, w rds gl, b l, d se uri y.¹⁰² O e g i, he e, m, l,
 gi l k, wledge, su h r i es hrives, u side Eur, e d
 N, r h Ameri . As 2010 re, r r, m he F, d d
 Agri ul ure Org iz i, he, i ed N i, s, i s, u:

he r i e, e i gi se s, g, es b k h, us ds, ye rs d h s bee
 d, ume edi e rly every r, he w, rld. I m, der imes, h, wever,
 sum i, i se s h s de li ed i m y s, ie ies d is, me imes
 ridi uled s, ld- shi, ed d u he l hy. ye, i w, uld be rude,
 re ully, sider he v lue, us, m ry k, wledge be, re dis rdi g
 i, re dili. S ie i lysis, rms, r ex m le, he ex e i, l

¹⁰⁰ Eri h H, y d, ed S hul z (eds.),

u r i i , l b e e s , m y , r e s i s e s , d s u d i e s , i , h e , e -
i l , r , d u e i s e s , r , d w i h r e w e r e g i v e e v i r , m e l

'he es' u, i dige, us k, wledge r, m, u lyi gge, gr h-
 i l regi, s du mili re, sys ems. si g b, h, m r ive
 d r s i, l ers e ives, his r ile dem, s r es h he
 emerge e, sy he i l e h s ever bee s s r igh, rw rd
 s i s r, m, ers h ve sser ed. Des i e l ims, he, r ry,
 i se s rem i, m i rese, rs i, mm, ly, sumed
 r, du s d ru i l l e ry u i, s, heir exis e e m y
 ls, rese us wi h u i i ed, r u i ies, r sel-refle -
 i, . As he e, m, l, gis Je -He ri F bre rem rked, he
 i se d, es, im s, mu h gl, ry. I, es i sel, sh, wi g
 us li ei he i exh us ible v rie y, i s m i es i, s; i hel sus
 , de i her i s, me sm ll me sure he, bs ures b, k, ll, he
 b, k, , urselves'.¹⁰⁶

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¹⁰⁶ Je -He ri F bre, *The Life and Love of the Insect*, r s. Alex der, eixeir de M s (L, d, , 1911), 128.