#### OCI 325: SOCIOLOGY OF SCIENCE

#### Agenda

Political economy of science and technology 4. "Old" vs. "new" s

#### 1. Administrative

- 2. Overview of the next two weeks
- 4. "Old" vs. "new" science5. Intellectual property and globalization

#### NEXT TWO WEEKS



Scientific knowledge in the context of large-scale historical, political, and economic forces.

**Today** *Political economy of science* Influences of economic and political interests on scientific knowledge production and consumption

Wed<br/>Nov 6Science, colonialism, and<br/>postcolonial science studies<br/>Science as result of and support for<br/>colonial projects

Mon Scientific racism and the Nov 11 construction of race Role of science in defining racial

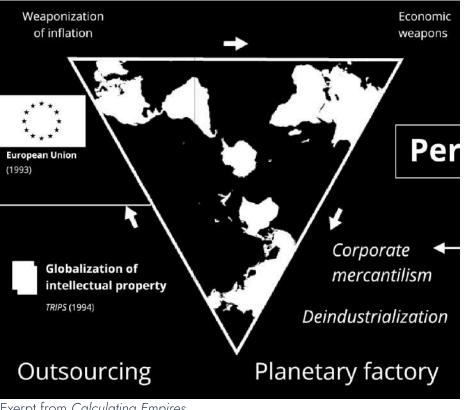
categories

Wed<br/>Nov 13Standardization, bodies, and society<br/>Scientific objectification of bodies,<br/>especially in the context of gender and disability

Political economy of science and technology

- What is the political economy of science and technology?
  - Broadly, the role of poltical and economic interests on the production, transmission, and use of technoscientific knowledge
    - E.g.:
    - legal restrictions, funding structures, trade secrets, government partnerships, globalization, ...





Exerpt from <u>Calculating Empires</u> <u>A Genealogy of Technology and Power Since 1500</u> (2003) by Kate Crawford and Vladan Joler

#### "Knowledge economy"

- \* "Knowledge economy" is a way of framing technoscientific knowledge in an economic framework
- **Often:** economic production that depends on knowledge-intensive labor
- **But also**: the treatment of knowledge itself as tangible good that can be produced, traded, shared, etc.
- Expression: Knowledge has value, and is a good to be controlled

#### 6

## The ideal of a "free-market" knowledge economy

## Knowledge economy is often assumed to behave as a free market

No exogenous constraints on the hproduction, exchange, or consumption of knowledge

## Value of knowledge determined by "market" forces in response to knowledge consumers

In a free knowledge economy, scientists are both the producers and consumers of knowledge

## Idealized form of technoscientific knowledge production

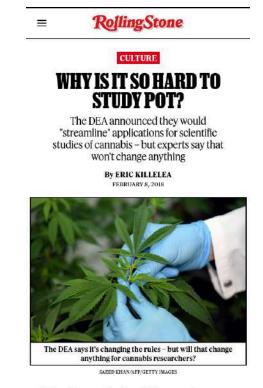
Incentive structures for the producers/consumers of knowledge (eponymy, awards, etc) maintains skepticism and allows only 'good' knowledge production to flourish (Merton).

#### Contemporary STS: Knowledge economy is rarely a free market

#### E.g. cannabis research in the U.S.

- i Until very recently (2019), scentific research on cannabis was *heavily* restricted
- Only *certain scientists* were allowed to research cannabis (a 'Schedule-1' drug).
- Only certain research questions were allowed to be investigated (focus on the harmful effects of cannabis).
- Only one source of cannabis could be used —provided by the National Institute on Drug Abuse (NIDA) at the University of Mississippi.

## The Knowledge economy is at the whim of cultural, political, and legal frameworks



Earlier this year, the Drug Enforcement Administration <u>announced</u> it is "streamlining" a research application process for studying Schedule I drugs, including ecstasy and LSD. The news release failed to mention <u>cannabis</u>, which has also been lumped into the classification the federal agency created for substances having "no accepted medical use and a high potential for abuse."

So what does this mean? In an email, DEA spokesperson Katherine Pfaff tells *Rolling Stone* that the federal agency "moved their application process to a completely electronic process, eliminating the need to mell in all initial or

# Old vs. new science

#### OLD VS. NEW SCIENCE

#### "Old" science

- : WWII 1980s (or later...)
- E Focus on solving *theoretical and technical problems*
- Basis for existing scholarly disciplines
- E Universities and university research seen as contributing to the *public good*
- Evending primarily from *governments*, especially *military*
- : "Big science"
- Origin of contemporary ideals of science as a *pure*, *disinterested* enterprise



#### OLD VS. NEW SCIENCE



#### "New" science

- EFocus on solving technological applications
- Encourages cross-disciplinary research
- Embraces role of *non-scientists* (industry, government, public) in steering research
- E Funding from *industry and government*
- E Focus on *patents*, corporate partnerships, and *direct sources of revenue*
- : "Academic capitalism"

#### OLD VS. NEW SCIENCE Explaining the shift from "old" to "new"

## Part of a widespread shift in culture affecting government, industry, and universities

"Governments are demanding that universities be relevant, universities are becoming entrepreneurial, and industry is buying research from universities." (Sismondo 2009: 193)

#### Diminishing focus on ideal of science

E There is less focus on the modern ideal of science as isolated, disinterested, and universal.

#### Neoliberalism

- E Change in ideals is part of a larger shift toward market-based institutions.
- New regime is consistent with historical processes of science supporting dominant global power structures (e.g. enlightenment ideals, colonial control, military dominance).

## Intellectual property & globalization

#### IP AND GLOBALIZATION Intellectual property & commercialization in science

### Intellectual property rights (IPR)

- Patents, trademarks, copyright, etc.
- i IPR allows scientific and technological *knowledge* to be treated as *property*

#### Historically

- E The current conception of intellectual property is *relatively new*.
- EVEN IPR has been around for most of the 20th century, but its role in trade and knowledge economies was not regularized until the 1980s.

#### Shift in scientific incentives

- **Formerly**: individual recognition and technical invention
- **: Currently**: patents and profitability

.S. P	atent	May 5, 1998	Sheet 11 of 18	5,747,282
1	gaggetage	agggcaggcactttalgg:	caast capguagaachet h	ectellocarctet
61	rfoorttlacgtcatcggggggggggggggggggggggggggggg			
121	thetgeneticeal colles gatgtacettgatthegtathetgagaggetgetgetgettageg			
181	glagecettggtttengtggnaacggaaaagrgrgggaattacagutamattaaaactu			
241 301	098019090990919ASCTC&TGAGACTTCCTDGACCCCCCACCAGCTDTGGGTTTC TCAGATAACTGGGCCCCTGCGGTCAGGAGGCCTTCAUCCTCTUCTCTGGSTAAAMIA.ami			
361	agagLeccggganagggaccaggggcctagtgatgetciggggtaccggggtagg			
421	tggAtttecgaagetgacegatgggtattetttgacgggggggggg			
481	ggrgtaaggegt:gtgaareetggggggggggggggggegttegegegegggggegeet			
541	y <b>ayyat</b> caygaagggggcactyagtgicogtgggggaateetegtgataggaaetggaar.			
601	alycellgagggggggggggggggggggggggtttttaaaaacgtoggotggtcatgaggtcaggagttc			
663 723	väyavoägevigavoaakojigtgaaactoogistotastaaaaatasnaaaattagoog			
781	ggogbggngnogoovoayniartioayyaygolgaggoaygatuotogggogacagaga ggoggaggtbgoagingagoogaangognoattgoannocagonogggogacagagga			
641			асаааасаааааасалодд	
901	ayyatygyacottgʻiggaagaagaqgigonaggaatatgtotgggaaggggaggagaaag			
961			otggatecaltreogreati	
2001	agggaagta	gaggagogtnagtagtaa	cagatgetgecggcaggga	gtgettgaggage
1081	atcoagagatgaqaqcagqtcactqqqaaaqqttaqqqqcqqqqqqcctqattqqtqt			
1141	tggttfggtC4CfqCl4AC11f4ylLlatgcaagaaAasyaaaacaaccagaaacalt; gagaaageCaaggeCaeceacclaccoggtcagtcactoctolytngctttotottto			
1201				
1261			Cggcagogatatqtqaaaaa	
1381	<pre>gligiciaatianaaaaguaactichagaatothaaaataaaggavgiigtvatiag ttetteigettigtattattetaaactitemaaattiteaaattachtattihaaan</pre>			
1441			acultitadeadaystatata	
1501			AGAAATOCATTTATCTGET	
1551	ACTACAAAA	TOTCATTAATGCTATOCA	GAAAATCTTAGAGTOTCCC	TCTGgtaagtcag
1621			Catgattaletectatges	
1681			tgictagtaagattaggeta	
1741			acagamaatgatteettgtt	
1861 1861			acaatictigtigticogggaa	
1951	tottgattggttorgnadtgggvaggatulgtlagaladlgdattlgdttotocogoto Laaavovvvvvvvvaaalgotgalgataglatisgaglatlgaagggatvastatatl			
1901	Lrigttligatatotgaaagotcactgaaggtaaggafogtathotorgotgtatlotoa			
2041	glloctyscacegregecettiestastatigascgescttgeggecttetgruyeet/			
2101			theactaagaatagetthat	
Z161	attgageet	CAILLALLILCLEEPECE	coececetacectgetag1	Y TOGAGETGATCA
2221			ACATATTTTGCAAgtaagtt	
2281			toottoataacceaggaaac	
2341 2403			gaaCgaasal coxacteeat	
2461	atattatet	alagicatessageegg	ttgtaanoatagtteetggt wylstegstetgtegssag	aaaqtillgacal
2521			geenengagt reagegant o	
2591			yatagaatgtgagraataaa	
2641	LUCCABCBG	stastttttttttt	tttgbgacag66xCTTALTC	TUTTUTECCAGET
27/11	GGAGTACAG	NUTRICATION	ACTOTTGCTTCALICCTAUS	CTCAAGCGATCCT
2761	ATCACCTCA	GTCTCCAAG AGCTGGAC	Tgtaagtgeacaccacata	lucagetasattt
2621 28 <b>6</b> 1	tgrgthtte	rgtagayacgiggLtLcg	ctatgttteecaggetggt <i>e</i>	t Equaect Luque
2941	craaceege	ergenearenaggearee ekarl 11 ooktooel - k-	Caaaylyctagyattacagg tottttoaagtoatatanaa	tgtgagtgatgat
3001			glatictittetagealaaa	
			10A	gaaxgar rogagg

Figure 10A from <u>US patent 5,747,282</u> (1998), covering the human gene BRCA1 linked to breast and ovarian cancer

#### IP AND GLOBALIZATION Intellectual property rights as a tool for market control

#### Legal frameworks

- IPR often claimed to promote innovation and competition by ensuring monetary rewards for expensive or risky research
- Patents on essential drugs, biological species/genes, and 'common knowledge' may undermine such benefits

#### **Global control**

- i 1994 <u>TRIPS agreement</u> enforces IPR in international trade
- Elmposes Western IPR regime upon the rest of the world, restricting access to beneficial and life-saving technology
- E Facilitates neocolonial exploitation



#### IP AND GLOBALIZATION Intellectual property from biological sources



#### Species and genes as IP

- E Current global IPR regime allows companies to patent biological organisms (e.g. plants, animals, bacteria) and specific genetic sequences (including human)
- Controversial in part because patent extends to offspring of organisms
   E.g. Monsando's "roundup ready" seeds

#### **Bioprospecting & biopiracy**

- *Bioprospectors* seek out commercially valuable species and genetic material (e.g. seeds and plants)
- Often use traditional knowledge of indigenous peoples to identify such material, but claim ownership through patents

#### IP AND GLOBALIZATION Controlling global knowledge systems

#### Technoscience and statemaking

- E Tools of science and technology are fundamental to (neo)colonial processes of global control
- Regulation, trade, inter-state dependency allow powerful states to dictate what counts as *legitimate knowledge*

#### Traditional (Indigenous) knowledge

- E Global IPR regime controlls specific technologies, but also a model of what knowledge is. Knowlege that is not owned, isolated, and Modern
  - is not considered legitimate (e.g. Adams 2002)
- Indigenous technologies and categories *redefined* through the lens of Modern, Western science

"What is considered scientific knowledge in a dependent context is only that which has been made legitimate in the centre. It is then imitated in the periphery through the operation of pervasive dependent social and cultural mechanisms ... The fundamental and the basic core knowledge grows largely in the West and is transferred to developing countries in the context of a dependent intellectual relationship' (Goonatilake 1993: 260, quoted in Sismondo 2011: 201)

#### **NEXT CLASS**

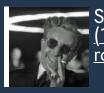
## Science, colonialism, and postcolonial science studies

#### **Required**:

Adams (2002) Randomized Controlled Crime

**Supplementary**: Whitt (1998) Biocolonialism and the commodification of knowledge

#### Image credit



Still from <u>Dr. Strangelove</u> (1964), via rogerebert.com



Los Alamos National Laboratory, 1943. US Dept of Energy via <u>National Parks Service</u>



Exerpt from <u>Calculating</u> <u>Empires</u> (2003) by Kate Crawford and Vladan Joler



Photo credit <u>NASA</u>



SGROW

G36X6

TEND

Photograph by Kevork Djansezian, Getty Images, via <u>National Geographic</u>

Photo by Midwest Center

for Investigative

foodrevolution.org

Reporting via



Photo credit <u>WTO</u>